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THE BRITISH AND EASTERN CONTINENTS edition of the Railroad Gazette is published each Friday at Queen Anne's Chambers, Westminster, London. It consists of most of the reading pages and all of the advertisement pages of the Railroad Gazette, together with additional British and foreign matter, and is issued under the name Transport and Railroad Gazette.

CONTRIBUTIONS.—Subscribers and others will materially assist in making our news accurate and complete if they will send early information of events which take place under their observation. Discussions of subjects pertaining to all departments of railroad business by men practically acquainted with them are especially desired.

ADVERTISEMENTS.—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and these only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially either for money or in consideration of advertising patronage.*

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When it was announced that this year's meetings of the American Railway Master Mechanics' and Master Car Builders' Associations would be held at Manhattan Beach many questioned the wisdom of the decision. That the committee acted wisely was proved by the conventions. The attendance of railroad men was fully 20 per cent. greater than last year, itself a record breaker, with an even larger percentage of increase in the number of supply men present. There were 280 exhibitors of railroad appliances, 24 more than in 1904. Overlooking some inconveniences which could be readily remedied, and much unnecessary railroad delay in handling the passengers and freight to Manhattan Beach, most of which would undoubtedly be avoided another year, it may be said without fear of contradiction (certainly as far as the members of the two associations are concerned), that the 1905 meetings were a complete success. It is true that there is no place quite so good as Saratoga Springs for holding these great and growing conventions; but for reasons well known to the committees having to do with selecting a place of meeting, it at last became imperative to go somewhere else; and an alternative has been found that can again be used. Were Manhattan Beach as distant from New York City as is Saratoga, the three hotels filled this year to overflowing could not possibly accommodate those who must attend; but as quite a percentage of both railroad and supply men live within an hour or a little more of the Beach and naturally prefer to go back and forth every day to enjoy home comforts, as well as to stop long enough to give some attention to office duties, the hotels are afforded a proportionate relief. The attractions of Coney Island and the nearness of New York City did not reduce the attendance. Those who went to Manhattan Beach went there for a purpose, and they carried out that purpose.

The Lake Shore & Michigan Southern holds the world's 500-mile speed record with a firm grip. It was over this line, eastward, that 63.61 miles an hour was made for that distance in 1895, part of the way with 68-inch driving wheels; and now a much better rate has been made, both eastward and westward. The improvement which has been made in these 10 years is due almost wholly to the increase in size of boilers, size of wheels and pressure of steam, as the Lake Shore track cannot have been materially improved; it was first-class in 1895. This great record is in part due to favorable conditions; a straight and level road in a territory not so vexed with city restrictions and such like hindrances as are other 500-mile lines; but this does not detract from the credit due the officers and men of the Lake Shore. The splendid quality of the best locomotives of to-day is well illustrated by the fact, mentioned in the report which we publish to-day, that from Toledo to Elkhart, 133 miles, the speed made in this latest trial run was equaled, with a full train, in regular service, without special preparation, in May, 1903.

It is painful to have to supplement the foregoing with an account of the disaster of June 21 on the same road. At this writing the reports indicate that no employee misplaced the switch which threw that train off the track; and, therefore, that if the track was reasonably well watched—and there is no evidence that it was not—the company is not to be held directly responsible for the misplacement. On this theory it was an "Act of God"—in creating a lunatic—or the inefficiency, blameworthy or otherwise, of police departments in not more effectually repressing evildoers as a class. But notwithstanding this shifting of the immediate responsibility, the existence on a high speed track of a facing point without distant-signal protection stands out as a great element of danger in an otherwise excellent roadway. The thought of it must be a horrid nightmare to any officer who is responsible for it, and who reads intelligently the records of the past. A lunatic may easily derail a train by other means; but from any reasonable public standpoint it is intolerable that any railroad company running trains at high speeds should give the lunatic such an easy way of carrying out his designs. One can readily imagine a mind so disordered that a facing point switch would be a distinct temptation to work destruction. But, human train-wreckers aside, and whatever may prove to have been the cause of this particular disaster, the existence of the dangerous switch is now made known to all the world; and the liability of sane and innocent employees to neglect their duty in connection with such a switch is also known to all the world. How many other such switches exist on that road? With men of the best grade, with a country free from fogs and with a two-mile view for the engineman, the liability to disaster from negligent misplacement of a switch is, indeed, remote; but when one reflects for a moment on the low cost of distant signals and on the horrible results of a single derailment, occurring perhaps once in 20 or 50 years, the satisfaction found in that word "remote" turns to ashes in one's mouth. The fast run of 1895 was made with all the switches spiked or attended by special watchmen. What was done to safeguard the special trains run this year is not reported. But what ought to be done to safeguard all trains is so plain as to scarcely need stating—have a distant signal for every facing point.

The New York, New Haven & Hartford, which of late years has been giving us a good many surprises in railroading, continues to offer striking novelties. Its latest stroke of policy is its device for relaxing the strain of business on the four-track main line between New York and New Haven, by driving the coal business away from it. After August 1 the present rates will not be accepted and the Western connections have been so notified. The New York division has very easy grades and represents corresponding hauling capacity. Yet, with the future completion of a new line from Port Chester, N. Y., to Danbury, Conn., a very large proportion of the Eastern freight is to be shifted to the Highland division, much of which is still a single track, crooked road with grades running up to 65 feet to the mile. It is only a few years since the first development of the "all rail" coal business was heralded as an important and profitable step in this conser-

vative company's history. This traffic has, in fact, so expanded as to amount to nearly 2,000,000 tons a year. Yet now it is to be diverted to the Sound ports and the "long haul" turned down for the shorter haul from those ports to destination. These announcements come, too, just at the time when we are told that, within a twelvemonth, replacement of old bridges will enable Mr. Mellen to put on his big locomotives, increase the train load, and apply his Northern Pacific policy to an Eastern railroad. No doubt the diversion of general freight to the inland route has in some degree its underlying motive as to economy and relief of the four-track congestion; but, with the transfer of coal to the Sound ports route, we hazard the guess that not many moons will wax and wane ere we hear in larger terms than now about "all rail" coal to New England by the Ontario & Western route. There's a difference between a very long all rail haul from mines held in ownership and a shorter all-rail haul from the mines of other corporations; and the fact has its suggestion as to future rivalries and complications in the New England coal traffic.

LARGE FREIGHT CARS IN EUROPE.

The question of cars of large capacity has attracted attention in Germany for years—nearly as long as their great utility had been demonstrated in this country; but there has been what will seem here as inexplicable hesitancy in following our example. Naturally it has been the coal and iron industries which have been most interested. When importations from Germany to this country had substantially ceased, and American iron works were beginning to export to countries which had previously imported from Germany, there was naturally a desire to know why we had within a few years been able to make so much iron and to sell it so cheaply. Investigations followed, and some of the published reports were extremely thorough, and seem to cover all elements of the cost of producing and marketing iron in the two countries. One of the chief advantages of the American ironmaster was found to be the cheapness of transportation; and this cheapness was found to be in great part due to immense trainloads, especially of ore and coal, loaded on cars of capacity three or four times as great as that of European freight cars.

These facts have been held up before the various railroad authorities, who have responded by providing a limited number of cars of 44,000 lbs. capacity, or one-third more than the recent standard, and double that of a few years ago; and for these they say it is difficult to find employment. The shippers have provided sidings, dumps and works suited to the old 10-ton cars, and have not seemed disposed to adapt their appliances to a different equipment. That they have been tempted by an offer of lower rates—approximating the lower cost of the transportation to the railroads—is not probable: the old-fashioned works would probably complain if they were; but that is the way the matter has been worked out here: the railroad which could make a profit of two dollars a ton, where with the old equipment it made one, has been willing to allow a part of the extra dollar, or even the whole of it, for any *increase* in business; the poorly-equipped works had to adapt themselves to the improved transportation or go out of business; and the result has been the vast expansion of the iron industry and of the transportation which makes it possible.

The *Journal* of the German Railroad Union and the French technical railroad organ, the *Revue generale des chemins de fer*, have recently occupied themselves with this question, and from them we are able to learn how far in these two great countries our example has been followed. France has but little coal, and consequently a comparatively small primary iron industry. A large part of its supply of coal comes from Belgium and England, and of its iron from these and other countries. But it seems to have been more active than might have been expected in trying large cars. About one-sixth of its freight equipment consists of cars of 33,000 lbs. capacity, and the Northern Railroad has 12,000 and the Eastern 4,000 cars of 44,000 lbs. capacity. The Northern has also 210 eight-wheeled cars of 88,000 lbs. capacity, and the Eastern has ordered 100 similar to these. The Southern Railroad, whose system lies between the Bay of Biscay and the Mediterranean, has a number of cars of 110,000 lbs. capacity, used for carrying ore to the Creusot blast furnaces at Cette, and these cars weigh only 33,000 lbs.

Of the 430,000 freight cars in Germany, comparatively few are built to carry 44,000 lbs. or more, and, as above remarked, shippers have not favored these few. The railroad authorities, however, seem finally to have decided that for Germany these are the cars of the future. They claim that they make them as light in proportion to load as American cars of twice the capacity, and that they have not traffic for larger cars. This latter statement must be taken with a grain of salt, however. Germany, with its great coal mines and iron industries, has a much heavier freight traffic than France, without mention of the railroads on our Western border and in the South, and in limited iron-making districts there is a very dense traffic. That the German receiver and shipper may be disinclined to use the large cars may very well be; but probably this disinclination will be remedied as soon as he finds that he is losing his business to those who use the cheaper mode of transportation, either at home or abroad.

STATE INSPECTION OF LOCOMOTIVE BOILERS.

Up to the present time the railroads of the country have been remarkably free from any legislative interference in the care and operation of their locomotives. This has been due to the fact that no regulation has been necessary, for the very obvious reason that all railroads pay the greatest possible attention to the inspection and maintenance of their boilers, thus rendering outside supervision unnecessary. It is more than probable that had the users of stationary boilers been as careful to employ skilled engineers, and looked as closely into repairs as the railroads have done, the state and federal inspection of boilers and the examination and licensing of engineers would still be an unknown quantity. The very fact, however, that owners were usually ignorant of the dangers attendant upon the use of steam and thought that the cheapest man was as good as the best as an engineer, made it necessary for the state to step in and supervise the whole business of steam generation and use in stationary plants as a measure of public safety.

Such a condition does not obtain, however, in locomotive practice, and there is not the slightest excuse for any interference unless it be to provide a place for some political worker. Still, the legislative desire to have a finger in every pie, where there is the slightest prospect of finding a plum, has led the lawmakers of New York to add one more official to the list of incumbents and to create an office that is useless in the extreme. According to a bill passed at the last session, every railroad operating within the commonwealth must "cause thorough inspection to be made of the boilers of all the locomotives which shall be used * * on such railroads * * * at least once every three months." Certificates of these inspections are to be filed in the office of the railroad commissioners and also with the official having immediate control of the operation of the locomotive.

The scope and the value of a law lie in the interpretation placed upon it. In this case, much or all depends upon what the duly constituted authorities may be pleased to consider a *thorough* inspection. That the boilers of every locomotive are inspected once in three months at the present time and that they are maintained in a safe and efficient condition goes without saying, and is proven by the remarkably small number of failures. It is also equally true that they are not thoroughly inspected once in three months, if by "thorough" we are to understand a complete internal and external inspection. As it is, the work is done at the exposed parts of the firebox and tube sheets where failures are most apt to occur, but the shell receives no attention whatever except when tubes are to be renewed or the engine shopped. This makes a wide variation throughout the country in the time limits of complete inspection, running from once in two months to once in two years, according to the quality of the water available. It follows, therefore, that to impose such an inspection upon the railroads once in three months would be an unnecessary and unwarranted hardship.

The provision that a certificate of inspection be filed with the railroad commissioners may mean much or little, according to the use that is made of it. If it is to be used as a means of proving that railroads have not complied with the law because in reporting an examination of staybolts and tubes they neglected the shell, so that the fine for non-compliance may be imposed, it will be more than a small burden; but if it is taken merely as a record of staybolt inspection, it can do neither harm nor good, for these records are already on file in the office of the superintendent of motive power of every road, and are accessible to the properly constituted authorities at all times. It appears, then, that the first section of the law will be bad or indifferent, according to the broad or narrow-mindedness of the officials upon whom its enforcement depends.

The second section deals with the appointment of a state inspector of locomotive boilers. The duties of such an inspector, whose salary is fixed at three thousand dollars a year or less, shall be to inspect, under the

direction of the railroad commission, the "boilers of locomotives used by railroad corporations operating steam railroads within the state, and cause the same to be tested by hydrostatic test, and shall perform such other duties in connection with the inspection and test of locomotive boilers as the commission shall direct." Where the usefulness of an inspector of this kind lies it is difficult to understand, and his chief value will probably be found in his availability to inspect and report upon a boiler failure in the name of the state, though the commissioners are already authorized to employ inspectors for this purpose. It looks very much as though the state were to be called upon to support an official who can hardly render services of sufficient value to warrant his existence, and whom the condition of affairs in locomotive maintenance and operation renders superfluous.

COLLEGE MEN IN RAILROADING.

In the records of Mr. Mudge and Mr. Delano, recently chosen operating heads of two large railroad systems, there is an interesting contrast. Mr. Mudge becomes Vice-President of the Chicago, Rock Island & Pacific as the most recent step in a railroad career which began when, at the age of sixteen, he was carrying water for a Santa Fe construction gang. Mr. Delano, on the other hand, brings the training of a Harvard graduate to the vice-presidency of the Wabash. The early record of Mr. Mudge has been typical of most successful railroad officers in the past, while Mr. Delano's would, until very recently at least, have been a notable exception to the usual rule. It was not many years ago that Mr. W. H. Baldwin, himself what might be called the historic example of a college man successful in railroading, said that the railroad manager had not yet arranged a plan for injecting the college man into his organization. There certainly has been a prejudice, and what has appeared to be a practical objection to college men in railroad work. In the first place, so-called "old-time" railroaders have oftentimes been prejudiced against those who have not gone through their school of practical experience from the beginning. Many of them have felt that as they themselves began carrying water or digging ballast before they were eighteen, every other young man should begin in the same way. In their view, college men were further undesirable because, on account of their education, they were likely to feel that they were better than other men. The seeming practical objection was that by going to college a man necessarily began railroad work at least four, and usually five or six, years later than he would otherwise have done. Fifteen or twenty years ago these two objections carried so much weight that a railroad officer with a college education was quite rarely found. There is, unfortunately, no practical way of finding out the number of such men who held important railroad positions at that time, but there is no doubt that the number was very small. Neither can it be doubted that at present the number is very considerable; in fact, it has for some time been clear that as, in spite of objections, men with a university training went into railroading, the objections themselves began to disappear. In the first place, many men of the practical school who had been successful without education could not at times help honestly feeling the lack of it. Unless they were narrow minded, this made them less prejudiced against men who had had that advantage, especially as by actual experience with college men as subordinates they found that in most cases, education instead of enlarging their hat bands had enlarged their usefulness. A vice-president of one of the largest systems in the country, himself not a college man, has been quoted as saying, "I have had a good many college men in my office, and I have never been disappointed in one of them." This, of course, is extra strong testimony, for no class of men are all of them satisfactory; but certainly there are a great many cases where college men have proved their executive ability and power to handle men in practical railroad work.

A few examples, three of them selected as representative and the rest comparatively recent appointments, are good proof of this statement. Mr. Delano and Mr. Baldwin have already been mentioned. Mr. Baldwin's successor as President of the Long Island, Mr. Ralph Peters, is a graduate of the University of Georgia. Mr. H. B. Spencer, the new General Manager of the Southern, is a Harvard graduate. Mr. George T. Slade, General Superintendent of the Great Northern; Mr. H. A. Worcester, lately appointed Assistant General Superintendent of the Michigan Central and Mr. W. W. Atterbury, General Manager of the Pennsylvania, are all Yale graduates. Mr. F. H. Clark, recently made General Superintendent of Motive Power of the Burlington system, is a graduate of the University of Illinois. Mr. W. S. Kinnear, Chief Engineer, and a short time ago appointed Assistant General Manager of the Michigan Central graduated at the Kansas State University. Mr. H. R. Safford, Assistant Chief Engineer of the Illinois Central, is a graduate of Purdue. With the exception of Mr. Baldwin, Mr. Slade, and Mr. Atterbury, all of these men were appointed to their new positions during the six weeks from March 20 to May 1. Although few of these positions are at the very top, the list shows the place in the railroad world which is coming to be held by college men. Twenty, fifteen, or even ten years ago, it is safe to say that the appointment of one college man to an important position during any period of six weeks would have been unusual. This year in no longer than that time there have been at least seven such appointments.

Even more recently has come the selection, on June 15, by Mr. Mudge himself, of Mr. F. O. Melcher as General Manager of the Central and Northern districts of the Rock Island. Mr. Melcher graduated in 1887 from the academic department of Tufts College, worked in the engineering department of the Fitchburg after graduation, and in 1895, one year before being made Chief Engineer of that road, was a second time graduated from Tufts, as a civil engineer. From his first commencement, he has been out of college no more than eighteen years. His experience does not at all help along the practical objection of time lost by going to college, nor do the records of the other men. Mr. Delano has been out of college 20 years; Mr. Atterbury's class was 1886; Mr. Clark's, 1890; Mr. Slade's, 1893, and Mr. Spencer's and Mr. Safford's, 1895. It would be rather hard to prove that any of them have been badly handicapped by their late beginning. On the whole, it seems proved, in spite of prejudices still remaining, that railroading affords to a man with a university training an opportunity almost parallel to that offered by what are generally spoken of as the "professions," law, medicine and the ministry. Ten or fifteen years from now, it is probable that the appointment of a college man to one of the chief positions on a railroad, will be far from being an exception, and will be very much nearer being the ordinary rule. The time will never come, of course, when men like Mr. Mudge will not, by sheer personal ability, make their way to the top; but it looks as though in the future more and more railroad officers are to be college graduates. If this is true, there can be no better proof of the success of the college in fitting men for practical life.

Railroads of the World.

At the close of 1903, according to the statistics gathered by the *Archiv für Eisenbahnwesen*, there were 534,232 miles of railroad in the world, and in each of its grand divisions the number of miles was as follows:

Europe	186,718	N. America	239,015
Asia	46,531	S. America	29,858
Africa	15,562	Australia	16,608
Old world	248,811	New world	285,481

Thus North America has 52,297 miles more than Europe, and the new quarters of the world 36,670 miles more than the old.

The miles of railroad opened in successive years has been:

1899.	1900.	1901.	1902.	1903.
13,533	10,800	16,953	13,338	13,138

Thus the addition in 1903 was slightly less than the average of the four previous years. Europe built considerably less than, but America built more than the average. The mileage opened in 1903 in each continent was:

Europe.	Asia.	Africa.	America.	Australia.
2,721	1,973	1,008	6,866	570

The increase in Asia is not half as great as in 1901, when the Siberian Railroad was being rapidly built. None of it was in Russia; about half of it in India, where is now about three-fifths of all the Asiatic railroad mileage. Since 1898, the railroad opened in Asiatic Russia and Manchuria had been 3,180 miles; in British India, 4,965 miles. Since 1903, however, a long Russian railroad has been opened in Central Asia. Japan is credited with 130 miles added in 1903, and China with 233; but China had but 1,176 miles in all, while Japan had 4,366.

In the same five years 4,403 miles were opened in Africa, and this largely in parts not many years ago scarcely penetrated by white people. Of the total 15,562 miles on that continent, 9,895 are in English colonies or protectorates.

The roof of a powder car ought to be a pretty substantial structure. An eastbound Panhandle freight train pulled into the yards at South Charleston, Ohio, on Wednesday, with the roof of a car containing 12,000 lbs. of giant powder afire. The car was uncoupled and the villagers attempted to combat the flames with buckets. Fearful of an explosion, nobody ventured close enough to throw the water where it would do any good, and the fire department was summoned. Lafe Holdren, the tower operator, from his post in the tower saw that immediate action was demanded, and mounted the blazing car, poking away the burning wood and fighting the flames with a small hand extinguisher. The crowd scattered, fearing an explosion, but Holdren remained at his post of danger until he succeeded in putting out the fire. This incident, reported in a press

despatch of June 22, is of interest not only as evidence of the grit of the tower man, but also as illustrating the fatuity of the superintendent, or freight agent or car inspector who had allowed the use, for carrying powder, of a car with a roof on which a spark could lodge in contact with combustible material. A recent disastrous explosion of powder cars on a Southern road was caused by a spark lodging on a defective roof. Why should explosives be loaded in anything but the most perfect cars? A loose or decayed board in a car roof is a direct invitation to red hot sparks to lodge on that roof, if they happen to be flying that way. The new rules of the Pennsylvania railroad for carrying explosives forbid the loading of these articles except in cars which have steel underframes, and which are "in first class condition." If there is any chance of a car catching fire, it needs a watchman close at hand throughout its journey.

If we read between the lines of the report and accept the positive statements made in the discussion on cast-iron wheels, at the Master Car Builders' convention, it is safe to conclude that there is some doubt as to the advisability of using such wheels under cars of 100,000 lbs. capacity. The data given as to the strength of flanges to resist rail pressures are new and the experiments that were roughly outlined should be carried out to the end in order that clear cut definite results may be obtained; and this should be supplemented by investigations as to the stresses that are put upon wheels when passing curves of different radii, through a wide range of speeds and while carrying various loads. As was stated in the topical discussion, the wheel is put into service without the slightest idea of the amount of work that it has to perform or whether it has the strength to do it, except that based on the old rule of thumb that it has not failed except under heavy loads, and a hope that the last wheels applied will be all right. The only light on the matter is that regarding the strength of flanges, and this strength has been found to vary from 47,000 to 116,000 lbs., according to the type of wheel and the character of the metal. What should now be done is to carry out such an investigation as that outlined above for the determination of wheel stresses in service. This would require some time, but the apparatus need not be either complicated or expensive. The preliminaries of such an investigation are now under way, regarding the vertical stresses on a wheel, and, when these are concluded, it is to be hoped that the means will be found to continue them until the data needed for an intelligent understanding of the subject have been obtained.

NEW PUBLICATIONS.

American Street Railway Investments, 1905. The McGraw Publishing Company, 114 Liberty street, New York. 415 pages, 9½ x 13 in. Price $5.

The present issue is 53 pages larger than the edition of 1904, an increase due in part to the addition of reports from new roads, but chiefly to the fact that many roads have furnished a statement of earnings this year from which figures have not heretofore been obtainable. Among the new features in the manual this year is an index which is bound in the back of the book. Heretofore only the names of the companies reporting have been included in the index, but this year the index has been enlarged to include the names of all underlying companies which have bonds outstanding even though the company may not at this time have any separate corporate existence. This enables the investor to refer readily to the report of the company which now operates the road of any former company. The introductory portion of the book contains a list of companies classified according to their gross receipts. However satisfactory this may be to the investor, it is not particularly so to the statistician, and it is to be regretted that a concise physical statement of the properties similar to that incorporated in the beginning of *Poor's Manual* has not been included. It will be recalled that in a recent issue of American Street Railway Investments the census report giving these characteristics was incorporated, and in spite of the imperfections of this report it was quite useful. There is at present a considerable dearth of accurate physical statistics of trolley roads. The roads in this book are classified by states and by towns within each state, and the population of the locality through several census periods is given after each town. This is a useful piece of information to have at hand in forming an idea as to the value and possibilities of a local traction system.

Annual Statistical Abstract for 1904. Published by the American Iron & Steel Association, 261 South Fourth street, Philadelphia, June, 1905. 136 pages, 5¾ x 9 in. Price $5, or 21s.

The American Iron & Steel Association has issued its annual statistical report for 1904, to which is added a statistical abstract covering a long period of years. It embraces all the leading features of previous reports and also many new features. The statistics of production of iron and steel are full and complete and tables are also given showing annual imports and exports of iron and steel, tin plates, iron ore, etc. Tables are given of the shipments of iron ore from the Lake Superior and other mines; prices of iron ore and of coke; imports and exports of coal and coke; tonnage of steel vessels built in this country in 1903 and 1904, etc. Like the admirable and little known volume which the statistician of the New York Produce Exchange gets out each year, the book at hand gathers up in highly condensed form important information which it would require a tremendous search to get together by any other means. Good statistics are sufficiently scarce so that a book of this sort deserves the highest praise for the careful and thorough manner in which it has been gotten out.

Proceedings of the Society for the Promotion of Engineering Education. St. Louis meeting, 1904. 253 pages, 5¾ x 8¾ in. Price $2.50. Engineering News Publishing Company, New York.

The volume at hand, in addition to a list of members of the society, contains an address by President C. Frank Allen on the outlook for engineering education and 14 other papers on this same general topic, by such authors as J. A. L. Waddell, Alexander C. Humphreys, William G. Raymond and Ira N. Hollis. President Allen in his address spoke of the fact that the society is 11 years old and now has a membership of about 375. He assumed without question that in the future as in the recent past for positions directly in engineering the graduate of the engineering college will in general be demanded, and that even more than in the past the positions of prominence, the prizes in the engineering field, will mainly go to the school-trained men.

TRADE CATALOGUES.

Cranes.—The Northern Engineering Works, Detroit, Mich., is distributing its catalogue No. 20. This contains upwards of 100 pages, which illustrate and briefly describe the wide range of crane designs made by the above company. A number of full page illustrations showing these cranes as used in well-known shops in various parts of the world are also given.

An Electrified Railway Shop.—The Crocker-Wheeler Co., Ampere, N. J., sends an interesting pamphlet bearing the title "An Electrified Railway Shop Described by its Engineer." The pamphlet is illustrated throughout and describes in detail various methods of applying motor drive to machine tools.

Manila Rope.—The C. W. Hunt Co., West New Brighton, New York, sends its catalogue No. 054. It is handsomely illustrated throughout with line and half-tone engravings and contains a brief treatise for engineers, on ropes used for the transmission of power, together with formulæ, tables and data useful in mill engineering.

New Railroad Laws in New York.

The Legislature of New York has this year passed four acts affecting railroads generally, two affecting street railroads, and four railroad bills which apply only to New York City.

Chapter 631 is the well-known Elsberg bill, transferring from the Common Council to the Board of Estimate and Apportionment the authority in New York City to approve the route of a new railroad.

Chapters 669 and 670 are to enable the New Haven road (the Harlem River & Port Chester) to acquire land in Pelham Bay Park in the city of New York.

Chapter 599 amends the New York City Rapid Transit act of 1891 so as to enable the city to make separate contracts for the use of galleries for electric wires in connection with subways.

Chapter 651 adds a section to the railroad law to facilitate adjustment of differences between cities and street railroads concerning car license fees, percentages on gross earnings, and other payments, except taxes.

Chapter 453 requires street railroads in Kings and Queens Counties to put vestibules on their cars.

Chapter 611 provides for a state inspector of locomotive boilers. It requires every railroad operated by steam power to cause thorough inspection of the boilers of all locomotives at least once every three months, by competent and qualified inspectors of boilers. The inspector must make a written certificate of every inspection and file the same in the office of the Railroad Commissioners within ten days after inspection. Every railroad or operating officer violating the law is liable to $100 penalty for each offence and $100 for each day of neglect to comply with the law. The State Railroad Commission is to appoint a competent person as inspector of locomotive boilers who shall, under the direction of the Commission, inspect boilers or locomotives, used by railroads; and he may cause the same to be tested by hydrostatic test.

Chapter 489 amends Section 78, Chap. 565, of the railroad law (1890) so as to permit approval of leases of railroads by the stockholders at an annual meeting, provided the notice of the meeting has stated that the question of such approval will come up.

Chapter 727 amends Section 2, of the Railroad law, relating to powers of corporations, so as to allow a corporation to be formed to build and operate an extension or branch or cut-off of an existing railroad or for shortening or straightening or improving the line or grade; also (Section 7) to acquire real estate for any purpose stated in the Railroad law, with power to condemn, where necessary. Every railroad may make and use any additions, betterments and facilities

needed and may condemn real estate therefor.

Chapter 728 enlarges the State Railroad Commission from three members to five. One of the five must be experienced in railroad business. The term of all the commissioners is five years. The aggregate monthly expenditure for traveling expenses, heretofore $500, is now limited to $900; and the total of the annual expenses of the Board, aside from rent of offices and printing and binding the annual reports, is limited to $100,000 (formerly $60,000).

The New York-Chicago Fast Trains.

In response to our requests for records of the high speeds which have been made on the lines between New York and Chicago during the past three weeks, the Lake Shore & Michigan Southern has given us the record of the movement of the special trains which were run over that road on June 12 and 13, with a view to testing the capacity of the line for high speeds, and the Pennsylvania has given us a brief note concerning the record of the regular runs of the 18-hour trains over that road for the first 11 days (June 11-21). Both companies give descriptions of the engines and the weight of the trains, but neither has much to say concerning the very high speeds made for short distances. On both roads single miles were run in 40 seconds at innumerable places, but there is nothing authentic concerning anything faster than this; nor is there any information as to what is the best rate that has been made for five miles, 10 miles, 20 miles, etc. All records of this kind (which have been plentiful in the newspapers) appear to have been made by reporters, passengers and trainmen; but usually without using a stop watch or otherwise taking care to secure perfect accuracy. The information received is summarized below:

LAKE SHORE & MICHIGAN SOUTHERN.

Westbound, June 12, 1905. Private cars, 201, 203, coach 340.

	Time over division, hrs.	min.	Distance, miles.	Average speed pr hour, miles.
Engine 4692.				
Lv. Buffalo .. 5:15 a.m.				
Ar. Cleveland. 7:50 a.m.	*2	35	183	70.8
Engine 4665.				
Lv. Cleveland. 8:00 a.m.				
Ar. Toledo ... 9:33 a.m.	1	33	108	69.66
Engine 5003.				
Lv. Toledo .. 9:36 a.m.				
Ar. Elkhart..11:30 a.m.	1	54	133	70.0
Engine 695.				
Lv. Elkhart..11:33 a.m.				
Ar. Chicago . 1:05 p.m.	1	32	101	65.86

Average speed (525 miles):
Including stops .....67.45 miles per hour.
Excluding stops.....69.69 " "

Eastbound, June 13, 1905. Private cars 201, 203, coach 340.

Engine 695.				
Lv. Chicago . 6:50 a.m.				
Ar. Elkhart.. 8:22 a.m.	1	32	101	65.86
Engine 4661.				
Lv. Elkhart.. 8:24 a.m.				
Ar. Toledo ..10:18 a.m.	1	54	133	70.0
Engine 4665.				
Lv. Toledo ..10:20 a.m.				
Ar. Cleveland.11:51 a.m.	1	31	108	71.20
Engine 3707-685.				
Lv. Cleveland.11:53 a.m.				
Ar. Buffalo .. 2:23 p.m.	†2	30	183	73.20

Average speed (525 miles):
Including stops .....69.53 miles per hour.
Excluding stops .....70.94 " "

*Including a 2-min. stop at Erie.
†Including a 3-min. stop 1 mile east of Dunkirk.

Some miles were made in 40 seconds (taken by stop watches) (90 miles an hour), but no miles were recorded at a higher speed; in fact, the speed of the trains was remarkably uniform over the whole road, being only slightly affected by the grades, only .3 of one per cent. in either direction. The stop one mile east of Dunkirk was made on account of a hot tender journal. In no other respect was there any trouble with hot bearings on engines, tenders or cars during the two trips.

Weight of cars about 58 tons each, or 175 tons.

The classes of engines used on these trains are the standard passenger types used on all the fast through passenger trains between Buffalo and Chicago. Engines 685, 695, 4,661, 4,665 and 4,692 are all of the 2-6-2 type, weighing 175,000 lbs., with 130,000 lbs. on drivers; tenders, loaded, 124,500 lbs.; cylinders, 20½ in. by 28 in.; driving wheels, 80 in. in diameter when new; steam pressure, 200 lbs.*

Engine 3,707 is of the 2-6-2 type, weighing 233,000 lbs., with 165,000 lbs. on drivers; tender, 156,000 lbs.; cylinders, 21½ in. by 28 in.; drivers, 79 in. outside diameter when new; steam pressure, 200 lbs.†

Engine 5,003, 4-6-0 type, weighs 171,600 lbs., on drivers 133,000 lbs.; tender, 124,500 lbs.; driving wheels, 80 in. diameter outside when new; 200 lbs. steam.

These runs are decidedly better performances than that of 1895 (October 24) when the Lake Shore made its great run from Chicago to Buffalo at 63.61 miles an hour; and this shows the improvement in locomotives in these 10 years; but a perfectly satisfactory comparison is impossible because of certain differences in the conditions. The 1895 run was for 510 miles, the limited-speed section of the road in the city of Chicago being omitted; while the run now reported is from terminal station to terminal station, 525 miles. On this account the average of the Chicago division is lower than that of either of the others. The weight of the train in the run now reported (350,000 lbs.) is nearly one-fifth greater than the weight of the 1895 train, but the engines are also more powerful. The best division run in 1895 was that from Erie to Buffalo (72.9 miles an hour including stops), made by Engineman William Tunkey, with 68-in. drivers. The speed this year over the division between Toledo and Elkhart (where there is a tangent 70 miles long) which will be seen to have been exactly the same in both directions (70 miles an hour for 133 miles) is almost exactly the same as was made by the regular Twentieth Century Limited, westbound, May 25, 1903, when the train was behind time; and that was done with a heavier train (four cars, 500,000 lbs.) and by a smaller engine, No. 603.

The 1895 special made the trip only one way, eastbound. The two records are as follows:

Oct. 24, 1895, 510.1 miles; speed, including stops, 63.61; speed excluding stops, 65.07; weight of cars, 304,500.

June 13, 1905, 525 miles; speed, including stops, 69.53 miles an hour; speed, excluding stops, 70.9 miles an hour. Weight of cars 350,000 lbs. The 1895 run was reported in the *Railroad Gazette* of November 1 of that year.

PENNSYLVANIA.

No difficulty is found in maintaining the schedules uniformly. At some points where construction work is going on it is necessary to deviate somewhat from them, but the time so lost is easily made up. No effort has been made to make excessive speeds, and the instructions are that the trains shall be run according to the schedules, which have been carefully prepared and equated for grades and other physical characteristics. No official record has been taken of the actual time for any given mile, but inspectors on the trains have informally reported miles in 40, 42 and 44 seconds, and that 75 miles an hour has been frequently attained.

These trains were placed in service to meet what the Pennsylvania Railroad believed was a pretty general desire upon the part of the public for an 18-hour schedule, and not for the purpose of making a sensation, or for spectacular effect.

*Described in the *Railroad Gazette*, March 29, 1901.
†Described in the *Railroad Gazette*, Dec. 2, 1904.

During the seventeen days since June 11th that the trains have been in service, the eastbound train has arrived at Jersey City on time fourteen days, and has been late three days—one day 84½ minutes on account of a freight wreck; one day 48½ minutes on account of an accident to equipment west of Pittsburg, 25½ minutes being made up on the schedule from Pittsburg to Jersey City; and one day 1½ minutes on account of drawbridge being open at Hackensack river, just outside of Jersey City. Westbound, the trains have reached Chicago on time fifteen days, and have been late two days—one day eight minutes occasioned by a freight train of another road within sight of the Chicago station; and one day 39 minutes on account of hot journals, 50 minutes being made up on the schedule from Pittsburg to Chicago.

Each of the trains consists of:

	Pounds.
1 composite car—library smoking compartment, buffet, barber shop, bathroom, and baggage compartment, weight	110,000
1 dining car, weight	132,000
1 sleeping car, 12 sections, drawing-room and stateroom, weight	120,000
1 compartment-observation car — 6 compartments, observation parlor and platform, weight	115,000
Total weight of cars	477,000
The trains are hauled by Class E (Atlantic) type of locomotive, either Class E-2 or Class E-3a.	
1 Class E-3a locomotive and tender, in working order, weight	315,600
Total weight of train	792,600

The principal dimensions of Class E2* are as follows: Pairs of driving wheels, 2; diameter, 80 in.; cylinders, 20½ in. x 26 in.; type of boiler radial stay, wide firebox; diameter of boiler inside smallest ring, 65⅝ in.; number of tubes, 315; diameter, 2 in.; size of firebox inside, 72 in. x 111 in.; area of grate, 55.5 sq. ft.; heating surface, 2,640 sq. ft.; steam pressure, 205 lbs. per sq. in.; weight of engine in working order, 176,600 lbs.; weight on drivers, 109,000 lbs.; weight of tender, loaded, 132,500 lbs.

The principal dimensions of Class E3a are the same as those of Class E2 except that the cylinders are 22 in. x 26 in.; weight of engine, 183,100 lbs.; weight on drivers, 118,200 lbs.; type of boiler, Belpaire, wide firebox.

The tenders carry 5,500 gallons of water and 22,000 lbs. of coal.

*Pennsylvania locomotive Class E2 was described in the *Railroad Gazette* of June 19, 1903, and there was also a large drawing of the engine in the issue of July 20, 1900.

The Cape to Cairo Project.

A correspondent of the *London Economist* writes: In our time there is not going to be any Cape to Cairo Railroad. It is not justified from financial or commercial reasons; it is physically impracticable and Africa promises to develop in a hundred directions before this particular plan is accomplished. The Cape-Rhodesia Railroad, with northern terminus at the Victoria Falls; the Uganda Railroad, with terminus at Port Florence, and the Egyptian-Soudan Railroad with southern terminus at Khartoum, are the basis of the scheme. To connect these three roads, thousands of miles of new line would have to be built. It is not possible to justify the immense expenditure involved, for there is no commercial need for a trans-African railroad as there was for a trans-Siberian line or for trans-continental railroads in North America; there is as good and a cheaper route by sea. That there is need for railroads for the opening up of Africa is evident, and they will be built; but these will be lines running straight in from the sea and carrying goods to and from the interior via the nearest port. The whole trade of that portion of Africa between the Zambesi and Khartoum is as yet insignificant,

and the Uganda line, now building, will carry much of this direct to the coast.

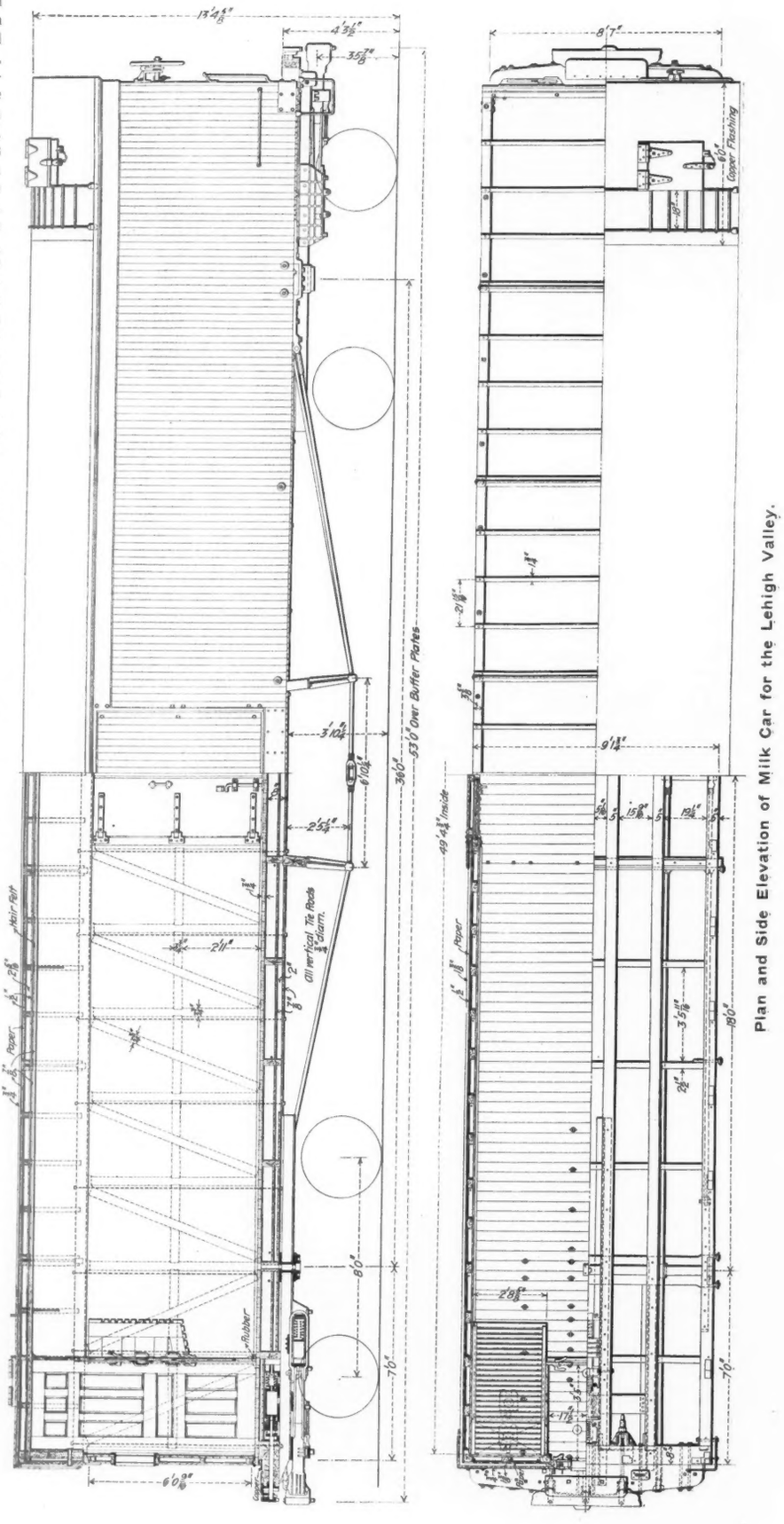
More than this, the Cape-Rhodesian, Uganda, and Egyptian-Soudan lines are all built on different gages. The Cape system is 3 ft. 6 in. throughout, and soon there will be 2,000 miles of the direct Cape-Cairo route, from Cape Town north to the Rhodesian copper mines, laid to this measurement. The Uganda line, which would be the main branch of the system, is 584 miles long, and is built with 3 ft. 3⅜ in. gage. It also has lighter rails than the Cape system, and even if relaid to 3 ft. 6 in., could not carry the engines of either the Cape or Egyptian lines. As regards the line in Egypt and the Soudan, which now terminates at Khartoum, there is even worse confusion. The railroads of Lower Egypt are built on the broad English gage (4 ft. 8½ in.), and this continues as far up the Nile as Luxor, about 400 miles from Cairo. From Luxor to Shellal, 150 miles, there is a 3-ft. 6-in. gage. From Shellal to Wady Halfa, 200 miles, there is no railroad at all. This part of the journey is made by river steamers. From Wady Halfa to Khartoum, nearly 600 miles, the line is 3 ft. 6 in., and that gage will be the standard for future lines in the Soudan.

Another drawback is the new line which is now being built from a port on the Red Sea near Suakin to a connection on the Nile near Berber with the Wady Halfa-Khartoum line. This will bring Khartoum within 500 miles of a seaport as against 1,400 miles at present, and connect the whole Soudan with its own port on the Red Sea. This is the real death-knell of the Cape to Cairo scheme, for this Red Sea outlet is destined soon to become the port for all passengers and merchandise to or from the south, and it is very doubtful whether after it is in operation, the railroad gap between Shellal and Wady Halfa will ever be filled in. This illustrates the statement that a long north and south overland route could never compete with a series of lines running inland from the coast. A physical drawback to a trans-African line lies in the immense area of swampy ground between Gondokoro and Victoria Nyanza. If it were ever decided to link up the Soudan with the Uganda road, with the object of providing an alternative route to India, the impossibility of carrying a line through this large tract of country would be realized, and a very wide detour to the East would have to be made. This would still further detract from the commercial advantage of any direct through system.

Milk Cars for the Lehigh Valley.

The Lehigh Valley is having four milk cars built by the Wason Manufacturing Co., which have a number of new and interesting features. This road has developed a large business in bringing milk into New York City, and now runs a train in the morning and one in the evening. These new cars have been designed especially for this service with a view of providing means for quick handling of cans, large capacity, easy riding and good refrigeration. They are 49 ft. 4¾ in. long inside, but 3 ft. 6 in. of this length at each end is taken up by the ice boxes and entrance vestibules.

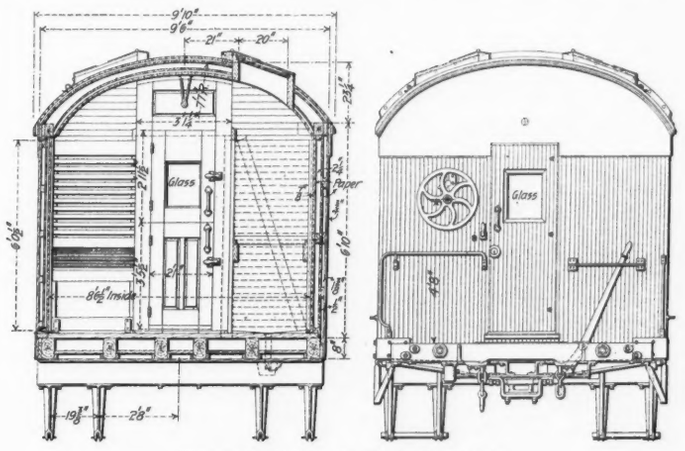
The side and underframing is very similar to standard designs for wooden box cars. The six longitudinal sills are 5 in. x 8 in. and they are stiffened by four 1⅜-in. truss rods anchored at the bolsters. The bolsters are shown in detail in one of the drawings. They are cast-steel, made in one piece and are stiff and strong. In the sides the usual form of framing has been employed with 3¼ x 2¼-in. posts and braces framed into the sills and plate with malleable iron shoes.



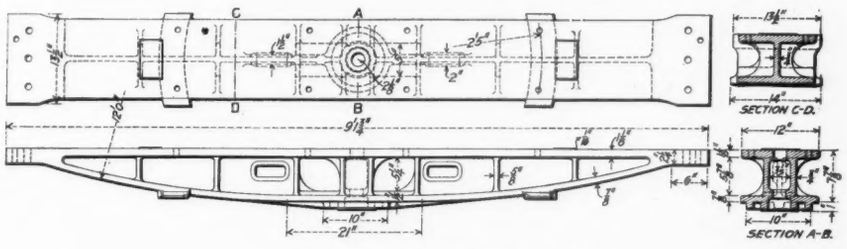
Plan and Side Elevation of Milk Car for the Lehigh Valley.

Double hinged doors, opening inward, are provided in the sides of the car in the center, for receiving and discharging the load, but the entrance doors are in the ends of the car.

The insulation has been well worked out and should prove satisfactory. The main floor is laid on top of the sills and extends out to the intermediate side sheathing. A ⅞-in. sub-floor is built in between the sills, leaving an air space 4⅛ in. deep under the main floor. The bottom floor is applied to the under side of the sills, leaving another air space 2 in. deep. In the sides there is the inside sheathing ⅞ in. thick, covered with a layer of paper, then a 2¼-in. air space between it and the intermediate sheathing, which is 2½ in. thick and covered with paper. The outside sheathing is ¾ in. thick and separated from the intermediate sheathing by a 1⅜-in. air space. In the roof the insulation is even more elaborate. The roof



Cross-Section and End Elevation.



Details of Cast-Steel Body Bolster.

is dome shaped and the carlins are continuous from plate to plate. Beginning on the inside there is ⅞-in. layer of boards, a ⅞-in. layer of hair felt, a ½-in. layer of boards, a $2^5/_{16}$-in. air space, a ½-in. layer of boards, a layer of paper, a ⅞-in. air space and then the outside roof ¾ in. thick. The side and end doors are insulated in the same way as the sides.

The car is iced from the roof through traps over the boxes, which flank the entrance vestibules on each side. The boxes are 2 ft. 5⅝ in. wide and 3 ft. 4 in. long, and extend from the floor up to the eaves. They project out into the body of the car for their upper half, an open board grating allowing the cold air to enter the car. The drip is collected at the bottom and led through a pipe through the floor. To give a good footing for the icing men, an iron ladder is put on the roof, extending clear across the car. From the ladder to the end of the car the roof is protected with copper flashing.

The cars are mounted on four-wheel passenger trucks and are equipped with Gould dummy platforms and couplers. They are piped for steam, air and signal lines, so that they can be run in passenger trains.

We are indebted to Mr. A. E. Mitchell, Superintendent of Motive Power of the Lehigh Valley, for the drawings and information.

Financial Results of the French Railroads in 1903.

The following statement and summary of the results of operation, from a financial standpoint, of the main French railroads in 1903, published in the Bulletin of the International Congress, supplements the article by C. Colson, Engineer-in-Chief of Roads and Bridges in France and Councillor of State, on French Railroads in 1902 and 1903, published in the *Railroad Gazette* of February 10.

By dissecting the accounts presented to the shareholders, it is possible to draw up a balance sheet for our railroads for 1903. As compared with the 1902 results, those shown in the following table appear satisfactory, but they are far from showing as active a recovery as there was every right to hope for, after the crisis of 1901.

The earnings have increased $5,637,600, whereas between 1901 and 1902 the increase amounted to only $3,499,200. But half the increase of 1903 comes from passengers, and the passenger traffic had been very much affected by the bad weather the year before, so that in 1902 the increase in this traffic, generally the most regular one, had amounted to only $972,000; if the two years are taken together, there is hardly a normal average increase. In the case of slow freight, the increase in 1903 is only $1,555,200. It was $1,360,800 in the preceding year; but in that year there had been extensive strikes at the collieries, so that it was only right to expect that a greater increase in 1903 would make up for the reduced progress made. Now instead of the compensation hoped for, we have a second year of very slow progress. The increased yields, in 1903, of coal, of metallurgical industries and of cereals, in the north and east, and of cattle transport in the west, are in greater part counterbalanced by the reduction in the transports of sugar and above all in that of wine, which suffered severely owing to the wretched production of 1902. The hopes of an industrial revival, which were held at the end of 1902, have only been realized to a very limited extent; and agricultural conditions, taking it altogether, have if anything been rather worse.

The working expenses which had increased by $16,690,400 in two years, from 1899 to 1901, and had diminished by $2,332,800 in 1902, were once more reduced by $1,555,200. The effects of the prodigious rise, which took place in the cost of fuel three years ago, have become reduced, without having entirely disappeared, owing to the long-period contracts usual for these supplies. The claims for loss and damage are once more of absolutely normal amount, now that the sudden increase in the traffic, which made it necessary to employ inexperienced men, has ceased. But the direct and indirect effect of the orders bearing on the working hours of the employees weigh heavily on the service; they make permanent increases in the number of the employees necessary, which are not only onerous for the railway but also make the improvement of the individual positions of the employees a slower matter.

The increase of capital expenditure, which had become more and more marked until it amounted to nearly $58,320,000 per year in 1900 and 1901, owing to the work executed in connection with the exhibition and to the abnormal purchases of rolling stock, made necessary by the increased traffic, has returned to a normal figure. It is made up as follows:

Expenditure by the State:	
Budget credits	$2,527,200
Advanced to companies	10,303,200
Local contributions	194,400
Expenditure by companies:	
New lines	2,721,600
Additional works	8,359,200
Stock and stores	6,998,400
Total	$31,104,000

As regards the accounts in connection with the guarantee of interest, nearly the same situation as the one so laboriously achieved in 1899 has again been reached: of the five great companies which have accounts to settle with the state, three in 1903 earned greater amounts, as compared with the revenue guaranteed, counterbalancing, to the extent of nearly $972,000, the deficits of the two others. Thus as regards the systems which have to appeal to the guarantee of interests under the 1883 conventions, in spite of the crisis which followed the 1899 boom and which is hardly yet surmounted, in spite of the increase in working expenses, the increased receipts from traffic have nearly covered the interest of the considerable amount of capital expended since that exceptional year, during which the results obtained were the best for any year out of the last 20 years. The five companies actually gained their former financial position: the Midi has once more reduced its guarantee to a very small amount; the Orleans has not ceased to make repayments to the state; the Eastern which after the extraordinarily prosperous years due to the brisk state of metallurgy in 1899 and 1900 had recommenced making small calls on the guarantee, once more has earned a surplus, and the same applies to the Paris-Lyons-Mediterranean Railroad.

This last company, which had expected to be able to repay its debt to the state from 1897 onwards, having then reached the net profit at which profit sharing commences (a net profit which it is true exceeded the guaranteed revenue by only $1,944,000), once more had a deficit of $3,207,600 in 1901 and of $1,360,800 in 1902. Under the conventions, of this total $4,568,400, $2,332,800 were debited to the railroad company, with power to

capitalize them by the issue of corresponding securities, and $2,239,000 could be called for from the guarantee; as a matter of fact, the company has met the deficit provisionally by financial manipulations without fresh issues and without assistance from the state. This year, it not only has no such deficit, but actually a surplus of over $1,166,400, which it will use to cover the previous deficit, instead of paying it over to the treasury, as it would have had to do if it had exercised its right of calling on the guarantee. The gross earnings of this railroad increased by about $1,555,200 in 1903, while at the same time the working expenses were reduced by more than $1,166,400, principally owing to an appreciable reduction in the train mileage. The alterations in the train service have, during the last 12 years or so, been one of the items largely affecting the variations in the working expenses of the Paris-Lyons-Mediterranean Railroad. Between 1890 and 1893 the total mileage had been increased from 39.1 to 44.1 million miles (12 per cent.), whereas the gross earnings has increased only from $69,206,400 to $70,372,800 (2 per cent.). The deplorable financial results of this increased expenditure led to energetic efforts to reduce it; as a result, the annual train mileage was reduced in 1895 by 1.2 million miles, and the subsequent increase was kept within narrow limits, so that in 1897, when the gross earnings were $79,315,200, the train mileage did not exceed 45.1 million miles. Between 1897 and 1901 the company was anxious to improve its service, and did not hesitate to increase the train mileage by 9.3 million train-miles (21 per cent.), whereas the receipts increased by only $6,998,400 (less than 9 per cent.). Once more the resulting deficit made retrenchment necessary, and reforms carried out during 1902 resulted in reducing the train mileage in 1903 50.6 million miles, with a reduction of $1,166,400 in two years, while the receipts increased by $2,721,600. So that, finally, taking the whole period from 1890 to 1903, the gross receipts and the train mileage increased almost in the same proportion, one by 28 per cent. and the other by 29 per cent.; but the improvements of the service instead of being regular and as increased receipts made them possible, were carried out by a series of impulses continually disturbing the habits of the public, and the alterations gave rise to strong complaints, sometimes as much when the number of trains was increased as when it was diminished. That is a very telling experience, showing that it is better not to be too liberal in times of prosperity, so as not to make it necessary, in subsequent bad years, to go back upon such premature improvements, which frequently are just completed at the time the greatly increased receipts which had originated them cease to be gained.

The Western Company also made considerable savings in 1903; although the receipts went up by $927,000, the expenditure was reduced by $583,200, after it had already been reduced by $874,800 the year before. The causes for this improvement are, besides the lower price of coal, the conclusion of the renewal work which had been such a burden on the resources of the company for a long time, and then also improvements in the organization of all the services. We stated last year that it would be a serious error to think that the great call on the guarantee (nearly $5,054,400) made in 1901 would be continued during future years; the deficit had fallen to $3,888,000 already in 1902, and scarcely exceeded $2,721,600 in 1903. It is still higher than that of 1899 by $1,263,600, although during the interval the net profit has increased by $486,000. This difference is explained by the fact that most of the railroads the deficits of which were charged four years ago to capital account, now call on the guarantee, and by the enormous expenditure on urban and suburban lines terminating near the Invalides: these works, which have materially increased the burdens of the company, are only now beginning to produce anything, and will no doubt not yield receipts proportional to their cost, until the districts they serve have slowly become transformed. But taking it altogether, the improvements in the situation of the Western Railroad continue, under conditions which explain the small success the proposed state purchase (which we discussed last year) met with in the Chamber. Whatever opinion may be held as to the relative merits of the two methods, working by the state, or working by companies, it must be recognized that the state would have had an unenviable job in replacing the company, as it would have had to begin by reforms which are never carried out without friction; and it is doubtful whether it could have done better than has been done during the last two years. The Minister of Public Works had announced that studies were being made in order to lead to a better delimitation of the State Railroad, the Western Railroad and the Orleans Railroad systems, by an exchange of lines, and in order to give the first an entrance to Paris which would render it more independent; the illness from which he has since suffered has retarded the negotiations. It is very desirable that they should be concluded; but the redistribution of the systems, though advantageous, is not an urgent matter. The really important matter is that no alteration of control should disturb the progress of the improvements now being made on the Western Railroad and that of the excellent management of the Orleans Railroad.

A singular fact which confirms the opinion that the guarantees and repayments made subsequently, do not exercise the deplorable effect on the management of main railroads often attributed to them, is that the only two systems which had in 1903 a net profit inferior to that of 1899, the State and the Northern, are railroads the deficits of which are not dealt with in this way. In spite of a material improvement in 1903, the excess of the receipts over the working expenses is lower than it was four years ago by $291,000 in the case of the State Railroad and by $583,200 in that of the Northern Railroad. Now during the interval, a capital expenditure of about $9,720,000 (found by the State budget) has been incurred by the former, and of $29,160,000 (found by the shareholders) by the latter; if, therefore, the payments for these two lines were liquidated by guarantee and repayment accounts, as in the case of the five other systems, they would show much worse results than the latter.

Taking it altogether, the 1903 results are not bad, in spite of the small increase in the receipts from slow freight traffic, which amounts to hardly 1 per cent. of the total amount, as against 7.5 per cent. in Germany, where the total increase in the gross earnings is $29,160,000, five times as great as with us. Unfortunately, the first few months of 1904 hardly justify the hope that this year will show greater or even equal improvement to 1903. On the Northern and the Eastern Railroads, the expected improvement in industry is not becoming at all marked, and the causes of uneasiness which restrain it are not disappearing; on the lines running through the wine producing countries, the small production of 1903 still makes itself felt, by a reduced traffic; finally at many points rain has stopped agricultural work and traffic of all kinds. Between January 1 and April 15, the gross receipts were

RESULTS OF WORKING THE FRENCH MAIN LINES IN 1903.

	State.	Northern.	Eastern.	Western.	Orleans.	P., L., M.	Midi.	Secondary railways.	Total.	Annual increase From 1895 to 1902, avge.	Annual increase From 1902 to 1903.
Railroad systems	1,802	2,361	3,045	3,604	4,536	5,779	2,299	9322	24,234[3]	193	311
Average length open, miles											
Results of Working.[1]											
Earnings, passengers	$3,499,200	$14,668,800	$12,052,800	$15,940,800	$14,094,000	$27,799,200	$7,192,800	$1,749,600	$97,297,200	+$2,041,200	+$2,721,600
" parcel traffic, etc.	1,263,600	4,276,800	3,790,800	4,179,600	5,540,400	11,469,600	1,944,000	194,400	32,659,200	+ +	874,800
" goods	5,151,600	26,535,600	20,509,200	15,940,800	25,466,400	48,600,000	12,733,200	3,304,800	158,047,200	+ +	1,555,200
" miscellaneous receipts	97,200	972,000	486,000	1,069,200	388,800	1,166,400	583,200	194,400	4,957,200	—	486,000
" total receipts	$10,011,600	$46,558,800	$36,838,800	$37,130,400	$45,489,600	$89,035,200	$22,453,200	$5,443,200	$292,960,800	+$5,832,000	+$5,637,600
Working expenses	7,387,200	25,369,200	20,703,600	21,578,400	21,578,400	43,156,800	10,886,400	4,860,000	155,520,000	— 3,499,200	— 1,652,400
Profit	$2,624,400	$21,189,600	$16,135,200	$15,552,000	$23,911,200	$45,878,400	$11,566,800	$583,200	$137,440,800	+$2,332,800	+$7,290,000
Guarantee of interest	.....	.....	— 174,960	2,779,920	— 719,280	— 1,224,720	369,600	1,302,480	2,332,800	— 777,600	— 4,043,520
Deficit capitalized	.....	.....	.....	194,400	388,800	.....	.....	.....	583,200	— 97,200	— 1,360,800
Annual capital expenditure:											
Charged to companies.[4]	$3,499,200	$2,332,800	$3,499,200	$3,304,800	$2,721,600	.....	$972,000	$18,079,200	+$1,555,200	—10,203,200	
Charged to state	$2,332,800	583,200	777,600	3,304,800	4,471,200	$1,166,400	194,400	12,830,400	97,200	583,200	
Earnings per mile	5,506.38	19,930.86	12,043.08	10,322.64	15,425.64	9,758.88	5,943.78	12,077.10	155.52	126.36	
Working coefficient.[5]	74%	54%	56%	58%	47%	49%	48%	53%	+ 0.2%	—2.0%	
Train mileage (millions of miles)	10.6	34.2	31.4	31.7	30.4	50.6	15.5	5.6	2.10	+ 4.3	—1.9
Average charge per mile in cents:											
Passengers	1.09	1.19	1.07	1.11	1.15	1.27	1.13	.....	1.15	—0.0101	—0.0202[6]
Goods	1.62	1.21	1.39	1.53	1.56	1.43	1.57	.....	1.45	—0.0182	—0.02828

[1]Figures derived from the reports issued to shareholders and not yet verified by the Government; the figures concerning the Midi Railroad have been calculated from various statements of accounts, to make them comparable with those of other lines; some of the data have been worked out on a somewhat different basis to that adopted in the official statistics, and hence the results shown in the last column do not exactly agree with those which would be obtained if the totals here given for 1903 were compared with those given in the precedent table for 1902 (see *Bulletin of the Railway Congress*, No. 10, October, 1903, p. 964).

[2]The two Ring Railroads included; approximate figures.

[3]Deducting joint runs, but inclusive of local lines worked by the Eastern and the Orleans railroads.

[4]Exclusive of the capitalized deficiency for lines whose charges are not yet debited to the guarantee account, but inclusive of the expenditure involved in paying back debts.

[5]Ratio of the working expenses to gross earnings.

[6]Apparent increase resulting from a change in the method of calculation by the Northern Railroad.

less by $1,360,800; only the Western Railroad was fortunate enough not to be thus affected. It may be hoped that the rest of the year will not suffer so much from bad weather and will make up for the bad results of the first quarter; but it will be seen that the reasons so often enunciated, during a good many years, to recommend extreme produce to the Chambers and the Government in any measure which may increase the burdens on railroads, have lost nothing of their weight.

The Use of Superheated Steam on Locomotives.*

(*Continued from page 722.*)

In the use of superheated steam on locomotives, a knowledge of its action in the cylinders is more important to explain the results obtained than it is useful in improving them, but its production in the boiler will require careful consideration in the future. It does not follow that because a certain degree of superheat results in a saving in the water required per horse-power hour, that there is a corresponding economy in fuel, in fact, it is invariably less than that in water, and it is quite possible that the consumption of coal may be increased to a point that neutralizes the economy in the consumption of steam. This may be illustrated by the following table, compiled by Mr. Strahl, of the Prussian State Railways, in which a constant volume of steam is assumed per unit of work and the efficiency of the boiler or the B.T.U. transmitted to the steam per pound of coal is taken as constant:

Superheat.	Economy per cent. Water.	Coal.
18 degs. F.	2.5	2
36 "	5	3.5
54 "	8	5
72 "	10	7
90 "	12.5	9
108 "	14.5	10
126 "	16	12
144 "	18.5	13
162 "	20.5	14.5
180 "	22	16
198 "	24	17
288 "	34	24

A simple way of estimating relative engine and boiler efficiencies is to allow .05 per cent. decrease in the water evaporated for each degree of superheat, which is very closely correct for a feed-water temperature 62 deg. and allowing 0.7 as the specific heat of superheated steam. In other words, if any boiler evaporates 100 lbs. of water into saturated steam with a given amount of coal, it will evaporate 5 per cent. less., or 95 lbs., into steam with 100 deg. superheat, and 10 per cent. less, or 90 lbs., with 200 deg. superheat. The exact figures at 150 lbs. boiler pressure are 94.34 and 89.30 lbs. respectively, and at 235 lbs. pressure, 94.39 and 89.35 lbs., so that in view of the uncertainty of the specific value of the heat, these rough figures are as accurate as any that can be employed.

*Extracts from a paper by Mr. H. H. Vaughan, Superintendent of Motive Power, Canadian Pacific, read before the American Railway Master Mechanics' Association, June, 1905.

The foregoing table is favorable to the boiler and, therefore, the coal economy, as it assumes that heat is transmitted as readily to the superheated steam as to the water, which is hardly reasonable in view of the higher temperature of the former. Where high superheat is concerned, this difference is quite considerable, and the amount of heat to be transmitted is important. The temperature of the feed-water in a locomotive may be taken at 62 deg., and at the pressures to be considered—150 to 200 lbs.—the heat of evaporation from that temperature is about 1,160; with a specific heat of 0.70, the heat to be added to the steam increases about .06 per cent. for each degree of superheat, and is 6 per cent. for 100 deg. of superheat, 12 per cent. for 200 deg., and so on. This heat is also transmitted to the steam at an average temperature higher than that of evaporation by 50 per cent. of the temperature of the superheat, and there must evidently be a sufficient difference of temperature at one portion of the superheater to transmit heat to steam that is 100 deg. or 200 deg. above the temperature of evaporation, as the case may be. In locomotives, the only designs of superheaters that have been so far considered practicable, or are likely to be, are those in which the superheating is accomplished by the flue gases, those types developed in stationary practice which employ separately fired superheaters, or tubes placed above the fire, being evidently impracticable, and these may be divided into two types—those in which a portion of the number of flues is utilized for superheating, and those in which a portion of the length of the flues is used for that purpose. The action of the flue gases in these two types may be illustrated diagrammatically as follows:

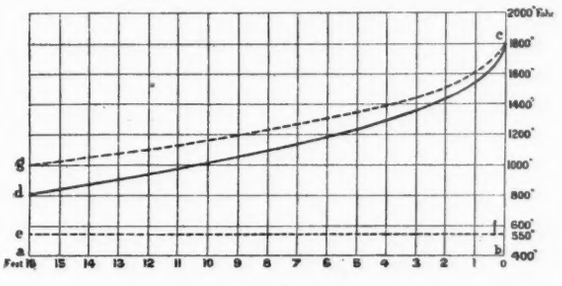


Fig. 4.

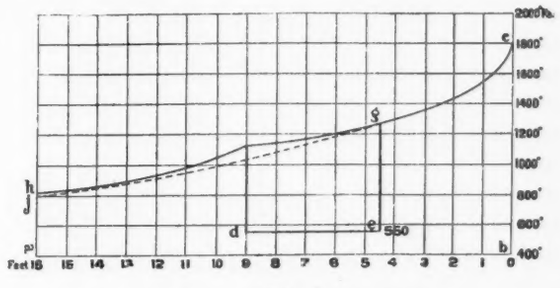


Fig. 5.

In Fig 4, a—b represents the temperature of the water or saturated steam throughout the length of the flues, c the temperature of the gases entering the flues, and d the temperature leaving the steam flues; e—f represents the average temperature of the superheated steam, and g the temperature of the gases leaving the superheater tubes, which is correspondingly higher than d. In Fig. 5, a—b and c correspond to Fig. 4, d—e represents the temperature and length of the portion of the flues acting as a superheater, and f—g the temperature of the gases at those points; h represents the temperature of the gases leaving the flues, and g—j the temperature in a boiler without superheater. It is evident, in Fig. 4, that unless sufficient superheating surface is obtained to make the difference between g and e less than that from d to a, that percentage of the gases entering the superheater tubes will leave them at a higher temperature than those leaving the steam flues, while in Fig. 5, all the gases leave the tubes at a slightly higher temperature, and this increased temperature of all or part of the gases represents a loss in boiler efficiency. No tests are so far available from which this loss can be quantitatively determined, as it is not only necessary to know the temperature of the gases leaving the tubes, but their amount. The nature of the loss, however, can be estimated from other data for an assumed case, and is of interest as showing its possible extent. An examination of some of the results recently obtained at St. Louis would appear to show that the proportion of the work done in the firebox is not constant, but is greater at low rates of steaming and is dependent on the brightness of the fire, but that for an average example it may be taken at 40 per cent. of the total. The drop in temperature of the flue gases may be taken at 1,000 deg., say 1,800 deg. on entering and 800 deg. on leaving the flues; this drop is obtained when the flues are maintained at a temperature of about 380 deg. If the flues were surrounded or filled with superheated steam at an average temperature of 100 deg. higher, the gases would be lowered to 900 deg. in place of 800 deg., or there would be a drop of 900 deg. in place of 1,000 deg. Since for 200 deg. superheat the amount of heat to be added is 12 per cent., or 10.7 per cent. of the total, and this is all obtained from the flue gases at an efficiency of .9, as compared with that required for evaporation, 10-9 of 10.7 or 12 per cent. of the total heat must pass through the superheater tubes, and as 12 per cent. of the total equals 12-60 or 20 per cent. of the heat developed in the flues, 20 per cent. of the flue gases will be released with a drop in temperature of 900 deg. in place of 1,000 deg., or with a loss of 10 per cent. If therefore, without superheating, the heat transmitted was equal to 40 units in the firebox, and 60 in the flues, then in this case, 40 would be delivered in the firebox, 48 in the water tubes, and .9 of 12 or 10.8 per cent. in the superheater tubes, a total of 98.2 or a loss of 1.8 per cent. This is evidently not of great importance, but in certain designs of superheaters it is possible to pass a considerable portion of the gases through the superheater tubes, and in one engine experimented with on the Canadian Pacific an improvement was obtained by reducing the proportion of gases passing to the superheater, showing that the possible loss on this account merits attention. It is evident that if in place of the gases leaving the superheater at a temperature 100 deg. higher than those leaving the water tubes, they were 200 deg. or 300 deg. above them, the loss would be 3.6 per cent. or 5.4 per cent. under the above conditions, and in such a case would become serious. The second type of superheater has evidently a slight advantage over the first in this respect, as the gases, passing through the water tubes after leaving the superheater, are reduced to practically the same temperature as those in an ordinary boiler, but sufficient has been said to deduce the conclusion that, while, with proper care in the design and adjustment, either of these types may be substantially as efficient as an ordinary boiler, that superheaters of the first type are susceptible to loss which may be serious, but which is necessarily minimized in the second. The first type has, however,

an advantage in the ease with which a considerable degree of superheat can be obtained, as any desired proportion of the flue gases can be diverted through the superheater, whereas, the second is more limited in this respect, since the distance from the firebox at which it can be placed is limited for practical reasons, and the amount of superheating surface is restricted at the same time. An inspection of the diagrams will show that, considering the large percentage of the heat in the flue gases that must be used for superheating, and the high temperature at which they must be brought in contact with the superheating surface, if the latter is not to be excessive, that any consideration of superheating in the front end must be abandoned, as the flue gases at that point have too nearly the required temperature of the superheated steam to allow them to transmit heat very readily, therefore, one of the two types mentioned or some combination of them must be employed. In view of the present small amount of accurate knowledge on this question, it is hardly worth while to further investigate it theoretically, as the value of the specific heat, the dryness of the steam entering the superheater, its rate of flow, and other factors complicate it to a point where accurate calculation is not possible. This question was carefully gone into by Mr. Otto Berner in a paper republished in the Bulletin of the Railway Congress in February, 1904, but it can hardly be said that the deductions are decisive on account of our indefinite knowledge of the various factors involved. It may be stated, however, that as the degree of superheat is increased, the water evaporated per pound of coal will decrease, not only on account of the additional heat contained in each pound of steam, but also on account of the decrease in the boiler efficiency due to the higher temperature of the steam to which the heat must be transmitted. This loss in efficiency will, of course, counteract to a certain extent the advantages gained in the cylinder and will reduce the gain from superheating beyond a certain amount. While the actual quantities are not at present known, this may be illustrated diagrammatically in a way that explains the results that are to be looked for. Fig. 6 shows the general form this diagram takes, the ordinates being per cent. of reduction in B.T.U. required per unit of work, or the pounds of steam per horse-power hour, corrected for the increase in the amount of heat per pound of steam on account of being superheated, and the abscissæ being the degrees of superheat. The line a, b, c shows the gain due to temperature or to the avoidance of cylinder condensation at 90 per cent. cut-off, taken at 5 per cent., the line b—d showing the further gain due to volume by further superheat, after cylinder condensation is avoided. The line a—e shows the gain due to temperature at 25 per cent. cut-off, by avoiding cylinder condensation up to cut-off, taken at 25 per cent., e, f, g shows the additional gain up to the point when steam is dry at release, point f; e—h shows the gain due to volume which commences when the steam is dry at cut-off. Now these lines, a, b, d and a, e, h, show a continuous gain when referred to the base line a—o, but if a line be drawn, a—n, showing the loss of boiler efficiency as the superheat increases, then by referring to this line as a base line, it will be seen that there would be no great advantage in increasing the superheat above point e for 25 per cent. cut-off, and that its most economical value depends on the slope of the line a—n. This slope will depend upon the type of boiler, and may be different from that shown on this diagram, but the steam lines, while not accurate, are reasonably so and it will probably be possible to lay them down for a simple locomotive in the near future; then, if a—n can be determined for any type of boiler, the total economy due to superheating can be shown and the desirable amount of superheat determined. One consoling fact in the experimental stage must be remembered—that no risk is being run of a loss, as whatever superheat is obtained is of value, and although if insufficient, the greatest economy is not obtained, the best results will have to be worked up to, as a sufficient amount of evaporative surface must be retained.

DESIGNS.

The designs of superheaters so far used are chiefly due to Mr. Wilhelm Schmidt, who has developed two distinct arrangements, both of which are of that type in which a portion of the number of flues is utilized for superheating. The design most generally used abroad is known as the Schmidt smoke-box superheater, and its special feature consists in the use of a tube of large diameter leading from the firebox to the front tube sheet, by which a considerable portion of the flue gases are delivered at a high temperature into an annular chamber at the front end, within which the superheater tubes are placed. The steam from the dry pipe passes into the rear end of a header, placed near the top of the smoke-box on the right side, which header is divided into a front and back portion by a transverse partition. From the back of the header the steam passes through the small superheater pipes to the rear end of a corresponding header on the left side, and from the front of that header through other superheater pipes to the front section of the right-hand header, and thence to the cylinders. The superheater pipes are curved to surround the gases flowing from the large tube, which then pass upward on each side and then into the smoke-box proper. As in all sperheaters of this type, a damper is provided to close off the flow of gases through the superheater when the engine is shut off, as at that time there is no steam in the superheater pipes, and they would be damaged by the hot gases if they were allowed to pass through freely. While this type of superheater has been extensively used in Germany, it has only been applied to one engine in America (No. 548 on the Canadian Pacific), and although the results obtained from it have been exceedingly satisfactory, and any desired amount of superheat can be obtained by an adjustment of the amount of gas passing through the large tube, it is doubtful whether it will actually make very much headway in this country. There is considerable complication in the front end, and a number of steam-pipe joints, which, while they have not given any trouble so far, are certainly objectionable, and since in the other design of superheater developed by Mr. Schmidt these difficulties are overcome, it appears probable that the latter, which is known as the smoke-tube superheater, will be the one generally employed.

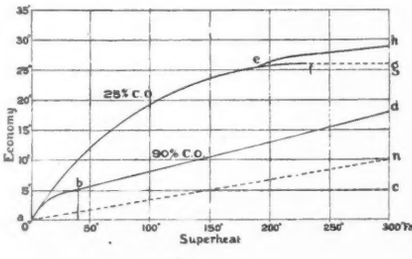


Fig. 6.

In this design, in the upper portion of the tube sheet, a number of large tubes—something over 20—are used in place of the ordinary 2-in. or 2¼-in. tubes. These large tubes are 5 in. diameter, reduced to 4 in. at the back tube sheet, and each contains two loops of 1¼-in. superheater pipes connected at the back end by steel return bends. The steam passes from the dry pipe to a transverse header in the smoke-box, which is divided by partitions into two portions, one for saturated and the other for superheated steam, and is arranged with a face on its lower side, having openings communicating with the saturated and superheated steam compartments. The loops of superheater pipes are expanded into flanges which are secured to this face, and the steam passes from the saturated steam compartment through the superheater pipes to the superheater steam compartment in the header and thence to the cylinders. In the modified form the face on the header is in the front in place of underneath, and the superheater pipes, in place of being formed in single loops, are in double loops, thus doubling the rate of flow of the steam through them and also the heating surface per loop. The amount of superheat obtained in this design depends upon the number of loops of superheater pipe, and Mr. Schmidt has recommended that, in place of 22 large tubes and 248 2-in. tubes, which took the place of 378 tubes in a similar boiler without the superheater, that the number of large tubes should be increased to 30 and the 2-in. tubes reduced to about 190. He also advises that the double loop arrangement gives superior results to the single and obtains a higher degree of superheat, both of which statements appear very probable.

In both of these arrangements, any required element of superheater pipes can be got at without disturbing all the others, but as originally designed, the flanges were secured by a clip bearing on two adjacent flanges with a bolt between them, and while this arrangement, once tight, gave no trouble in service, it is exceedingly difficult to get it tight to commence with, and it is now being superseded on the Canadian Pacific by independent bolting to each flange. This general design of smoke-tube superheater is a good mechanical arrangement, and has so far been very successful. The same amount of superheat usually cannot be obtained as with the smoke-box design, but it has developed no faults and it is difficult to see what expense will be incurred for maintenance. It can be applied very conveniently to the ordinary design of locomotive, simply requiring the front flue sheet to be set back slightly further than usual, but without further change, and on account of its simplicity will probably be extensively used in the future.

The Schenectady superheater is a modification of the Schmidt smoke-tube type and differs from it chiefly in the arrangement of the headers, and also in the usual use of an inner and outer pipe for leading the steam to the rear end of the superheater tubes in place of the looped pipes. In place of the superheater pipe in each superheater tube being expanded into flanges, which are bolted to the header, the pipes forming one vertical row of superheater tubes are all expanded into a sectional header, which is itself divided into saturated and superheated steam compartments. These sectional headers are in turn bolted to the main header, openings being arranged to correspond in the two compartments. This arrangement is very simple and convenient, and as each sectional header can be removed without disturbing others, it is convenient for repairs. The inner and outer tube arrangement reduces the number of joints considerably, through which steam may probably leak into the front end, but so far it cannot be definitely stated that this arrangement is as

efficient as the looped pipe. There is no reason, however, why the sectional headers cannot be used in connection with the looped pipe, and on 30 engines now being built for the Canadian Pacific the arrangement of looped pipes is identical with that used in the Schmidt smoke-tube superheater, but the pipes are connected to sectional headers of the Schenectady type. The original engines turned out with this design had 3-in. superheater tubes in which were placed pipes 1¾-in. in diameter, with an inside pipe 1-in. in diameter. These engines gave considerable trouble from the tubes stopping up with cinders, and a more recent design has been perfected, in which 5-in. tubes are used as in the Schmidt arrangement, but in place of loops, four Field tubes are placed in each 5-in. tube. One point of this arrangement is worthy of note, namely, the disposition of the pipes to allow a rod being passed through between them for cleaning purposes. Ease of cleaning is quite an important factor in superheaters, as in any design there is a liability of the tubes being stopped up by cinders, and while the looped pipe types do not give any serious trouble in this respect, the 3-in. tubes with single pipe inside have proved difficult to clean. The bending of the pipes to the header in the Schmidt arrangement is especially designed to permit of easy cleaning, as in Germany and other European countries it is the practice to clean the flues from the front end in place of from the firebox, as in America. No trouble has been experienced in keeping the superheater pipe joints tight in the Schenectady arrangement and the joints between the sectional and main headers are easy to make and remain tight in service, so that it may be safely stated that this design is good mechanically and suitable for American conditions, although further evidence is needed to decide whether the Field tubes are as efficient as the looped pipes.

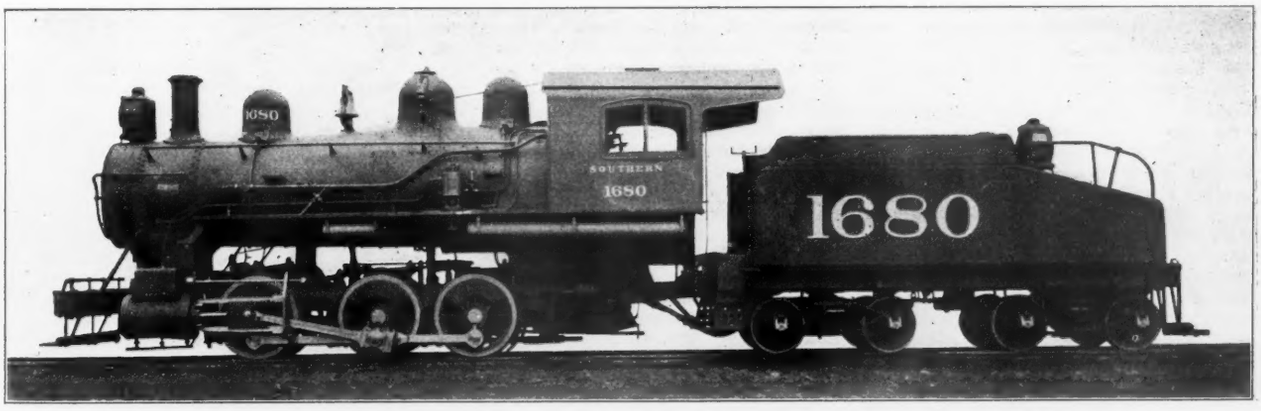
The superheaters so far described are all of the type in which a portion of the number of the tubes is devoted to superheating, and as yet there is only one superheater in use of the second type, in which a portion of the length of the flues is used for that purpose. In this superheater, called the Pielock, the flues pass through a superheater about the center of the boiler, through which the steam passes on its way to the throttle. The steam enters the superheater through a vertical pipe extending up into the dome, so as to obtain it in as dry a condition as possible, and is traversed across the flues by vertical partitions in the superheater, thus being in contact with them for a considerable distance before passing to the throttle. Since the superheater is always filled with steam at boiler pressure, there is practically no tendency to leakage, and as in addition, the temperature of the flue gases is lowered by contact with the flues before reaching the superheater, no damper arrangement is required. The tubes are slightly enlarged where they pass through the tube sheets of the superheater and are expanded at those points in order to make water-tight joints, and in case of any leakage or condensation occurring while the engine is at rest, a drain cock is applied to the superheater chamber. This superheater has several advantageous features from the theoretical point of view; any desired amount of superheat can be obtained by varying the distance it is placed from the back tube sheet and the length of the superheater, no damper arrangements are required, the efficiency of the boiler is but little affected by the addition of the superheater, as can be seen by an inspection of Fig. 5, and the ordinary size of flue is alone used, so that no special regulation of the draft is required. On the other hand, there are certain practical difficulties that may be experienced in its use, such as the possible loosening of tubes in the superheater tube sheets, which may lead to leakage that is not readily detected; increased trouble from flue leakage in the back tube sheet due to the movement of the flues being prevented by their attachment to the superheater, which may necessitate their moving in the flue sheet as their relative temperature varies, and trouble in removing incrusted flues through the holes in the superheater sheets. It cannot be stated that any of these objections have been developed in service, but they appear probable, and while the Pielock superheater would appear to be, in certain respects, the most satisfactory so far designed, yet it must demonstrate its freedom from practical objections before it can be generally used. No superheaters other than those described have so far been used to any extent on locomotives, but it is probable, in the future, that both modifications of the arrangements described and other designs will be brought out, and a reference to the patent records will show a number of superheaters of more or less promise, which have not so far come into practical use and need not therefore be referred to for the present.

(To be continued.)

Six-Wheel (0-6-0) Switching Engine, Southern Railway.

The Southern Railway has recently received from the Pittsburg works of the American Locomotive Company, 25 six-wheel switching engines which, while not so heavy as the class B-6 engines on the Pennsylvania, are heavier than any others in use on the Southern, and well above the average weight for other roads. They have a total weight of 143,200 lbs., all carried on three axles, as against 170,000 lbs. for the Pennsylvania class B-6 engines. This is a load of 47,725 lbs. per axle. The wheel base is 11 ft. The class B-6 engines have a wheel base of 11 ft. 6 in. and a tractive power of 36,200 lbs., with 22 in. x 24 in. cylinders. These engines for the Southern have cylinders 20 x 26 in. and a tractive effort of 32,708 lbs. on 185-lbs. steam pressure. The following table gives the principal dimensions:

Class	0-6-0
Cylinders, type	Simple.
" diameter	20-in.
" stroke	26-in.
Wheelbase, engine	11 ft.
Wheelbase, engine and tender	43 ft. 7¼ in.
Weight, total	143,200 lbs.
" on drivers	143,200 "
" engine and tender	233,500 "
Diameter of drivers	50 in.
Heating surface, tubes	2,376 sq. ft.
" " firebox	110.5 "
" " total	2,486.5 "
Grate area	29 "
Boiler type	Extended wagon-top
Diameter, first ring	63 in.
Steam pressure	185 lbs.
Fuel	Soft coal
Firebox, length	65⅛ in.
Firebox, width	65¼ in.
Tubes, number	300
" diameter	2-in.
" length	15 ft. 1½ in.
Capacity of tender, water	4,000 gal.
Capacity of tender, coal	7 tons.



Six-Wheel Switching Engine, Southern Railway.

Local Freight Agents' Association.

The eighteenth annual convention of the American Association of Local Freight Agents' Associations was held at Minneapolis June 13, 14, 15 and 16, President Newton in the chair. Over 200 delegates were in attendance, representing 54 local associations located in as many different cities. Six new local associations applied for membership and were duly elected as follows: Pueblo, Colo., five members; Galveston, Texas, six members; Sioux City, Iowa, five members; Duluth, Minn., five members; Superior, Wis., five members; Winnipeg, Man., two members. The national association is now composed of local associations in 78 of the largest cities in the United States and Canada, having 759 active, 145 honorary, 10 associate; total, 914 members.

Kansas City presented an able paper on handling switching and reclaim charges by use of interline waybill to be issued daily. The discussion again developed the long known fact that nearly every large city has a switching scheme of its own; and a committee was finally appointed to secure from each local association a statement of the various methods used in handling switching, the same to be condensed and printed and distributed to all members 30 days before the next annual convention, when the matter will again be taken up.

Louisville brought up for discussion "Feasibility of adopting a through conductor's

card waybill that will carry car through from point of origin to destination." This was found to be a very live matter. It is now in the hands of a committee of the Central Association of Railroad Officers, who have the question up with the various traffic associations. Printed copies of the latest through card proposed by the Central Association were distributed, and it was the sense of the convention that the through card and through billing arrangements would greatly expedite the movement of car load freight.

Omaha had an interesting paper on the completion of topics discussed at former conventions, which resulted in the appointment of a committee to compile and condense the fruits of the association's labors for the past 18 years into one handy volume.

St. Paul, Chicago, New York City and Toledo brought in papers on the "Credit" question from various points of view. Columbus, Ohio, and Buffalo, N. Y., read papers on the increase in loss and damage claims, suggesting remedies.

Lincoln, Neb., discussing "Freight Tariff Improvement," received the hearty endorsement of the convention. Chicago presented a uniform method for figuring the cost of handling freight at large stations, which received the unanimous endorsement of the convention.

Cleveland presented a conservative paper on "Car Service" (demurrage), which recommended uniformity in rules as a solution of this vexing question.

All of these subjects, except Chicago's, were referred to committees for further treatment.

Word was received from the convention of the Central Association of Railroad Officers at Kansas City asking this association to take up with each branch of the Central Association the collection of grain doors, as recommended at our 1903 and 1904 meetings.

The delegates devoted their entire time to business until noon Thursday, when they completed their labors and elected the following officers for the ensuing year: President, A. D. Oyer (C. & N.-W.), Chicago; Vice-President, W. S. Martin (Nor. Pac.), Minneapolis; Treasurer, J. H. Dunlevy (Penna. Lines), Pittsburg (re-elected); Secretary, G. W. Dennison (P. Co. & H. V. Ry.), Toledo (re-elected). The convention adjourned to meet at Montreal June 19 to 22, 1906.

The program of the Committee on Arrangements was carried out in full and kept the visiting ladies busy about 18 hours each day. Thursday afternoon the entire party, men and women, enjoyed a trip over the terminals by special train, stopping at Minneapolis and Hamline Transfers and the great Pillsbury "A" mill. They also visited later Lake Minnetonka. Friday morning Minnehaha Falls and Fort Snelling and other places were visited.

Before adjourning the association adopted unanimously a memorial to the President and Congress declaring that it would be unwise to enact such laws as were proposed at the last session of Congress relating to the making of freight rates or any other laws which would embarrass the railroad companies in making such rates as may be necessary to conform to existing and rapidly changing commercial conditions, to meet competition, and to promote, to the greatest possible extent, the free interchange of commodities between producers and consumers wherever they may be located.

The Russian Minister of Transportation has called attention to the great difficulty of providing fuel on the Siberian Railroad. During the early months of the war there were coal mines east of Lake Baikal which supplied a portion of the locomotive fuel, and wood was used on a large part of the line in Manchuria; but the coal mines soon gave out, and the cost of wood rose to prohibitive prices, at one time in Kharbin being equivalent to more than $20 per ton for coal. West of Lake Baikal a coal company at Omsk, which was supplying fuel for part of the line, became bankrupt and closed its mines, which made it necessary to haul coal in some cases a thousand miles over the most crowded part of the railroad.

Master Car Builders' Convention.

The thirty-ninth annual convention of the Master Car Builders' Association was held at the Oriental Hotel, Manhattan Beach, New York, June 20, 21 and 22. In many respects it was one of the most successful meetings the Association has had. President W. P. Appleyard presided, and in his address spoke in part as follows:

"We have well nigh perfected the rules, and are gradually standardizing devices under which is successfully carried on the largest interchange of traffic of the greatest nation of the world; and I may ask, Can there be more emphatic evidence of the harmony and honesty of purpose which actuates this body than the labors of thousands of good men, our car inspectors and repairers, scattered in railroad yards, dotted over our millions of square miles of territory, who are governed as a unit in their interchange of cars by the simple and just rules framed by this association? Although it is not printed in our code, the spirit of the Golden Rule has guided us, and I trust will always lead us in our deliberations and decisions.

"The Arbitration Committe's report which bears so largely upon our interchange rules, indicates clearly the effective value of our present code, there being only 15 cases presented for adjustment during the past year, and a number of these should not have been arbitrated because of previous decisions which governed the points at issue. It is therefore my opinion that our rules of interchange are serving their purpose admirably. . . , In this connection your attention is invited to those cases of cars damaged or destroyed by floods which the companies on whose rails the damage occurred decline to settle, notwithstanding the ruling of the Arbitration Committee in favor of the car owners, and although a precedent was established in like cases, so far as I am aware, this association has not heretofore been confronted by a question of this nature on a scale of such magnitude. It is needless for me to point out the serious phases of the situation, and if action is to be taken in the premises by this body, it should be guided by most careful thought and discussion."

After referring briefly to the recent developments in electrification of steam roads and the influence it might have on car equipment, he continued:

"Do we fully realize, or even remotely guess at what is going on in the field of automobile traffic? Has it occurred to you that with the advent of good roads, now yearly increasing so fast as to be scarcely comprehended, the automobile is swiftly to become a great factor in transportation, and that as machines are improved in power and endurance they will force a still more rapid development of good roads until it will prove a race as between roads and machines. . . . I predict that eventually national highways—broad, enduring and beautiful—will be laid like great bands from ocean to ocean, from the Gulf to the Canadas, over which high power vehicles will travel in endless streams. And yet, above all, there is in the dim distance the flying machine, developed already to dirigibility and long sustained movement. Nobody knows where that may land us.

"I have not, however, mentioned these things to indicate decadence of steam railroads, but to bring to your minds the ever-increasing competition for traffic which the steam railroad is encountering and to remind you that new problems of construction, maintenance and economy will be forced upon us through these agencies.

"The steel cars, both freight and passenger, are permanently with us, and while the problems incident to their construction and maintenance are being steadily worked out, there is yet much to be done to adapt them to conditions of service.

"Friction draft gear is beginning to receive the consideration which it deserves, and will undoubtedly prove a most valuable adjunct to our equipment when it comes into general use. In this connection I earnestly commend to you for thought and definite action means for obtaining the proper amount of side movement in couplers. . . . We are aware of the great strains imposed upon draft timbers and couplers, to say nothing of the wheel flange wear and destruction of rail, due to the fixed position of the coupler. Much has already been accomplished in this direction, and it remains for this association to take cognizance of the necessity and arrange for definite action. I have always maintained that any device or appliance, even though somewhat inferior, would, if made standard on all railroads, be far more desirable than many better devices which are not interchangeable, and because of this I hope that we shall have the courage of our convictions and adopt as recommended practice, and then as standards, things which we believe to be the best for our equipment and which could be made a common standard."

The Secretary reported a present membership of 607. The Treasurer's report showed a balance on hand of $3,469.

Mr. E. A. Moseley, Secretary of the Interstate Commerce Commission, was present and addressed the convention during its first session. His address was printed last week.

Inasmuch as the titles of positions in the car department have undergone a great many changes, new positions being created, among which are persons who would be valuable members of the association, it was thought by the Executive Committee that the constitution should be modified so that such persons would be eligible to membership. It was proposed to make Section 2 of Article III read as follows:

"Section 2. Any person holding the position of superintendent of the car department, master car builder, assistant mechanical superintendent, mechanical engineer, assistant mechanical engineer, assistant engineer of motive power, chief draftsman, foreman of a railroad car shop, joint car inspector, or one representative from each car manufacturing company, or other company owning or operating over 1,000 cars which are not in process of purchase by other parties, may become an active member by paying his dues for one year."

It was also proposed that Section 5, Article II, regarding life membership be modified so that either active or representative members who have been in good standing 20 years may become life members on the recommendation of the Executive Committee.

These proposed changes in the constitution lie on the table until the next convention.

The officers for the ensuing year are: President, Jos. Buker (Ill. Cent.); First Vice-President, W. E. Fowler (Can. Pac.); Second Vice-President, G. N. Dow (L. S. & M. S.); Third Vice-President, R. F. McKenna (D., L. & W.); Treasurer, John Kirby, re-

elected; Executive Committee, H. M. Carson, G. W. Wildin and T. H. Curtis.

Triple Valve Tests.—The report was presented by Mr. Wm. McIntosh, Chairman of the committee. The committee's recommendations that the present members of the committee be discharged and a new committee appointed, composed of men fully informed on air-brake matters, was adopted.

Brake Shoe Tests.—The report was presented by Prof. Goss, a member of the committee. There was no discussion.

Revision of Standards and Recommended Practice.—The recommendations of the committee were discussed seriatim. Under the third heading on "journal boxes and details" Mr. Schroyer (C. & N. W.), Chairman of the committee, explained that the committee was of the opinion that malleable iron is not the proper metal to use in a wedge for a 5-in. x 9-in. or heavier journal. It was suggested that the word "malleable" be taken out in so far as it applies to the use of those wedges on cars of 80,000 lbs. capacity and over, the substitute metal being wrought-iron.

This recommendation occasioned considerable discussion regarding the advantages and disadvantages of wedges of different sorts of metal including steel and cast malleable and wrought-iron. The recommendation finally was referred to letter ballot.

Under "brake head and shoe," in which the committee recommended an increase in length of shoe of 1¼ in. at each end and the addition of a rib on the side to strengthen the shoe against breakage, a number of members objected to either change, particularly the former. Mr. Schroyer said in regard to the stiffening rib that his road has used this reinforcing piece for a long time, and he had never known of a shoe requiring to be chipped to get it on or off. The amount of additional stock is small and one is compensated many times for it in the saving of the brake-shoes from breaking in handling them. It also stiffens the shoe to allow the use of a uniform shoe on a 36-in., 42-in. or 33-in. wheel, which is difficult to do with the old shoe unless something of a reinforcing character is put in. That is one of the advantages of the patent back that is now being used, the steel back.

In regard to increasing the length of shoe he said it would not increase the scrap waste. It is applied in such a manner that it all wears away in service; and being longer, it gives a better bearing against the wheel. The shoe is not nearly so liable to wear wedge shaped as a short shoe.

The recommendation on "brake-beams" was referred to letter ballot. It proposed reducing the length of beam ½ in. between centers of brake heads.

Under "standards for protection of trainmen" there was a long discussion regarding hand-holds or grab irons on car ends. The Central Association of Railroad Officers sent a communication recommending taking up with the Interstate Commerce Commission the abolishment of end grab irons, as with automatic couplers they not only are useless but are an element of danger, tempting men to go between the cars when it is unnecessary.

Mr. Moseley, Secretary of the Commission, spoke at length on the matter, saying that the Commission would not be inclined to take any such action.

A motion that the lower round on ladders with wooden sides be made straight, prevailed, as did also a subsequent motion to submit the modified recommendations of the committee to letter ballot. It was also suggested to the Committee on Standards that the grab-iron on the roof of the car be placed in line with the ladder on the car.

Under "center plates," the committee recommended reversing the members for the purpose of avoiding difficulties from dust and other foreign matter accumulating in the lubricated lower member in present practice. A motion to accept the recommendation and refer it to letter ballot was lost.

The recommendation of the committee under "uncoupling arrangements for couplers," suggesting a change in the uncoupling-rod bracket, will be submitted to letter ballot. The recommendation on "high-speed foundation brake gear" was adopted.

A motion was made to accept the recommendation under "permanent stake pockets and submit it to letter ballot. Mr. R. P. C. Sanderson (S. A. L.) said he thought the committee perhaps missed the point in the use of the slant in the back of the stake pocket; the object being that when the stake was driven into it, the top of the stake would lean toward the car. The stake would straighten under pressure from the load and be approximately vertical when the car was loaded. Putting the bevel on the outside would make matters worse. That slants the stake out to start with, and chains or turnbuckles would be needed to straighten it. The recommendation would be wrong as far as high loading is concerned.

Mr. Schroyer said with the bevel on the inside or back the only hold or leverage the stake had was the actual width of the pocket, whereas with the bevel on the outside the stake could be driven down to the bottom of the side sill and get a leverage equal to the full width of this sill.

The motion to refer to letter ballot was carried.

Motions to refer the matter of "temporary stake pockets" to the Committee on Loading Long Materials; to accept the report of the committee as a whole, and to appoint a special committee to consider the matter of the height of brake staff, were carried.

SECOND DAY'S PROCEEDINGS.

President Appleyard called the meeting to order and called for the report of the Auditing Committee, which was read. The reports of the Secretary and Treasurer were found to be correct.

Air-Brake Hose.—The report of the committee was read by Mr. Le Grand Parish (Lake Shore). He pointed out the value of the stretching test as indicating the quality of the hose to resist mechanical wear which is responsible for 80 per cent. of the failures of hose. The committee added to its report as printed a clause as follows:

"We would strongly endorse the recommendation of the Arbitration Committee, 'that on and after July 1, 1906, air-brake hose renewals will be considered wrong repairs unless they are made with hose in accordance with M. C. B. specifications and so labeled. The committee also wishes to bring very strongly before the association the necessity of insisting that all hose purchased be fully up to the specifications which should be considered as minimum specifications, and would therefore recommend that the label attached to the hose be copyrighted, and in order to prevent violations of the copyright the committee be empowered from time to time to remove new hose from cars and have them tested, the results of the test to be furnished the roads purchasing and applying the hose and also publishing these tests along with their reports of all hose tested. This committee should also be authorized to prepare specifications especially adapted to manufacture of woven hose."

Mr. A. W. Gibbs (P. R. R.) thought that the committee had drawn the specifications in such a way as to exclude railroad companies from experimenting with woven hose which in his opinion had a number of features of possible merit not possessed by wrapped hose. Mr. Parish, a member of the committee, called attention to the fact that one of the recommendations in the report reads: "The committee should also be authorized to prepare specifications especially adapted to the manufacture of woven hose." He said that he was entirely in accord with the views of Mr. Gibbs on the desirability of experimenting with woven hose, but that to prepare proper specifications would require much work on the part of the committee. He laid special stress on the fact the specifications for wrapped hose should be considered as minimum specifications, and that railroads were at liberty to buy hose of a higher grade if they so desired. On motion the report was accepted and ordered submitted to letter ballot.

Tests of M. C. B. Couplers.—The report of the committee (see *Railroad Gazette* June 23, page 737) was read by Mr. Kleine for the committee. Mr. R. P. C. Sanderson (Seaboard Air Line) referred to the seventh recommendation of the committee, which says "the tail end for continuous draft should be removed as being unsuited for approved practice in car construction." While he was convinced that continuous draft gear was a dead issue he felt that in view of the present dissatisfaction with the form of yoke attachment, as brought out in the topical discussion of the first day, it would be well to retain the slot in the coupler as offering another possible point of attachment for the yoke. One form of draft gear now in use is designed to utilize the slot with a key carrying yokes on the side of the coupler and springs, and he thought there were other possible improvements in this direction. On motion it was decided to change the wording of the recommendation so as to permit the slot to be retained, but not as a part of a continuous draft gear device.

Mr. A. E. Mitchell (Lehigh Valley) pointed out that in recommendation No. 8 of the report the drawing shows a coupler shank 9⅛ in. deep which is suited to the Westinghouse friction draft gear but is too large for the Sessions-Standard gear, which requires a shank 8½ in. deep, or the Miner gear which calls for a shank 8¾ in. deep. He was of the opinion that the shank should be made to accommodate all of the gears by making it to suit the smallest dimension, and using liner blocks to make it fit the yoke of the largest gear. Mr. E. D. Bronner (Mich. Central) called attention to the fact that the drawings of yokes for twin and tandem spring gears shown in the report were made some time ago, and were designed to accommodate the 6¼-in. spring. Since the drawings were made the 8-in. spring has come into quite general use for draft gear and it seemed to him that the yokes should be designed to take the larger springs. The 9⅛-in. coupler shank would permit the use of a yoke that would take any of the large spring gears or friction gears. Mr. J. J. Tatum (B. & O.) said that any of the gears could be used with a 9⅛-in. shank and yoke if thimbles were used on the follower plates to hold the springs or barrels in the proper position.

On motion the committee was instructed to change the drawings of the yokes for spring gears to show an alternative dimension of 9⅛ in. for use with the enlarged coupler shank, this change to be made before submitting the report for letter ballot. The report as a whole was accepted and ordered submitted to letter ballot for final adoption. The recommendation was approved that the coupler committee be empowered to act in conjunction with a special committee, including representatives of manufacturers to early decide upon a composite design of coupler embodying the best features of couplers now in service, all patent rights involved

to be waived and all makers to be allowed to manufacture the composite standard coupler as approved.

Rules of Interchange.—The meeting next took up the report of the Arbitration Committee, which was presented by Mr. J. J. Hennessey (C., M. & St. P.). The decisions of the committee during the past year were unanimously approved and the discussion of the proposed changes in the rules was then proceeded with.

The St. Louis Railroad Club suggested that the Master Car Builders' Association request of the Interstate Commerce Commission that where cars are delivered in interchange with safety appliances inoperative, no prejudice be held against the receiving line if such a car is marked to the receiving line's repair tracks for repairs. The Arbitration Committee was of the opinion that the Interstate Commerce Commission would not grant such a request, and Mr. Moseley being present he was asked to explain to the association the stand which the Commission had taken in the matter. Mr. Moseley said:

"This matter has only recently come up before the Commission. Judge Humphrey in his recent decision, which we must follow, says that if you attempt to couple on to a car that is in defective condition so that the men have to go in between the cars to make the coupling, you are violating the law. As I understand this request you are asking the Interstate Commerce Commission to relieve you from a violation of the law, and this the Commission has no power to do. The law says that the men shall not be allowed to go between the cars and that the railroads shall not use cars in such a condition that the men must go in between them to couple or uncouple. You cannot ask the Commission to relieve you from the provisions of the law.

"In Chicago the railroads are having trouble because they have to send back so many cars. The same trouble occurred in Kansas City with cars of perishable freight and live stock. The Commission refused relief and the railroads began to take the proper steps to see that the safety appliances were in good order so that cars could be accepted promptly. After a while the railroads in Chicago will learn the same lesson and the present difficulty will be cleaned up. When a railroad learns after a few lessons that a car will come back to it if it is delivered with safety appliances out of order, it will take care to have them put in order before attempted delivery.

"There is no antagonism on the part of the Commission. Suppose some employee is killed or injured and his case goes into court. Is the argument that the car was delivered to you only a few minutes before and that you did not know of its defective condition any answer to make? The Commission cannot relieve you of responsibility in such a case."

Mr. C. A. Seley (C., R. I. & P.) asked Mr. Moseley just what the expression going between the cars meant. Did it mean going between the cars at the time that the coupling was actually being made, or did it include cases where the cars might be 40 ft. apart. Mr. Moseley replied that if a man goes in between cars at any time, no matter what the distance apart, he is violating the law, but that the rule of common sense should be and generally is applied in such decisions. Under present conditions it is necessary for men to go between the cars to couple air-brake hose, and it may be that this is a violation of the law, but no one would think of prosecuting on such grounds. The time was undoubtedly coming, he thought, when automatic hose couplings would be in use as widely as automatic car couplings. Mr. T. H. Curtis (L. & N.) suggested that possibly every railroad which applies a car coupler without a knuckle throwing device was guilty of a violation of the law. The discussion was closed and the meeting took up the definite recommendations of the committee.

Mr. W. F. Bentley (B. & O.) was opposed to the proposed change in rule No. 10 limiting the wear of wheel flanges under 80,000-lb. cars to $1^1/_{16}$ in. on the ground that it would cost the railroads a large sum of money to replace wheels now in service under such cars which were still perfectly safe to run but which had worn down to 1 in. thickness. He thought worn flanges were not the cause of most broken flanges. Mr. A. W. Gibbs (P. R. R.) was of the opinion that too much could not be done to reduce the danger from broken flanges and he heartily endorsed the proposed change which would make it more certain that wheels worn thin in the flange and unsafe to run would be removed before breaking. Mr. J. J. Hennessey said that as a matter of fact the change would not greatly decrease the mileage of wheels for after the flange once began to wear sharp the wear took place quickly and the difference of $^1/_{16}$ in. would not appreciably affect the mileage. The committee's recommendation was approved.

Taking up Rule 34, the Air-Brake Committee suggested the insertion of a clause as follows:

"On and after March 1, 1908, cars offered in interchange must be equipped with M. C. B. standard hose; if not so equipped, owners are responsible for application of standard hose." This recommendation was approved by the Arbitration Committee and a further addition approved as follows:

"On and after Sept. 1, 1907, all cars offered in interchange must be equipped with air-brakes." Both clauses were adopted.

In considering the committee's recommendation as to the revised prices for journal bearings, Mr. J. J. Tatum (B. & O.) said that the rule did not cover credits for filled bearings. In case a road replaced a filled bearing with a solid bearing it credited the owner with 10 lbs. of brass valued at $1.10 and actual retained 10 lbs. of malleable iron worth 5 cents, thereby losing $1.05 on the transaction. Mr. Sanderson pointed out that such a procedure should be covered by the rule governing the replacement of manufactured articles at current market prices. The original suggestions of the Arbitration Committee were adopted.

After all the other recommendations of the committee as shown in the printed report had been adopted without change, the meeting took up the question of what action, if any, should be taken in regard to the refusal of the roads to comply with the rules and the decisions of the Arbitration Committee, the question arising on the appeal of the Pennsylvania Railroad in the matter of the refusal of the Missouri Pacific to settle for a car destroyed on its tracks at Kansas City at the time of the flood in June, 1902. The Arbitration Committee had held that the bill was correct and should be paid, but the car department of the Missouri Pacific acting under orders from the General Manager refused to honor the bill.

Mr. R. P. C. Sanderson was of the opinion that the association had no authority to act in the matter, one way or the other. He thought the question of responsibility for destroyed cars was one for the general managers to decide among themselves. Mr. W. E. Symons (Kansas City Southern) concurred with Mr. Sanderson that as subordinates, the members of the association had not the right to dictate to their superior officers, and that any action which might be taken would appear presumptuous. He was in favor of proceeding no further in the matter.

Mr. A. W. Gibbs (P. R. R.) asked why the Master Car Builders' Association should exist if its rules and agreements could be abrogated and disregarded at will. He laid great stress on the precedent established by the action of the Missouri Pacific by which any road could claim to refuse to abide by the terms of the agreement which it had signed in good faith and could still expect to retain all the benefits of membership in the association.

Mr. J. J. Hennessey (C., M. & St. P.) did not think that in severely censuring a road failing to live up to its agreement, the members of the association were without their authority or were in the least presumptuous. As members of the association the master car builders represent their superior officers and act with their sanction in all things. The general managers by officially approving the acts of their subordinates become parties to their acts and in this case become parties to the agreement covering interchange of cars. He was of the opinion that if this matter was dropped as it stood the association might as well disband. He pointed out that this was not the first time the same question had arisen and in every case the railroad on whose tracks cars were destroyed by fire or flood or storms had paid for the damage without demurring. To attempt to define what an act of Providence was would involve endless controversy and confusion in settling claims in which relief would be sought under the provisions of such a rule if it were inserted. As Mr. E. D. Bronner had said the only way to decide such cases would be to have Providence made a member of the Arbitration Committee.

Mr. A. E. Mitchell (Lehigh Valley) thought the Rules of Interchange were in the nature of a formal and binding contract and that the breach of contract existing in the case in question was sufficient grounds for an action in any court.

Mr. D. F. Crawford (Penna. Lines West) said that if the Rules of Interchange constituted an agreement or contract and one of the parties was guilty of a breach of performance, then that party was of necessity no longer entitled to any of the benefits of the agreement. He was of the opinion that no action tending to deprive the Missouri Pacific of its rights and privileges was required for it had already deprived itself of them by its breach.

No formal action was taken other than to approve the report of the Arbitration Committee as a whole.

Revision of Passenger Car Rules.—The report (see *Railroad Gazette*, June 26, page 735) was read, and after the committee had explained one or two points on which members were in doubt it was accepted and ordered submitted to letter ballot for adoption, the present code of rules to remain in effect for the coming year.

Truck Arch Bars for 100,000-lb. Cars.—The report of the committee (see *Railroad Gazette*, June 26, page 740) was accepted without discussion and ordered submitted to letter ballot for adoption.

Safety Appliances.—Mr. D. F. Crawford read the report of the committee, which follows: The committee does not concede that the use of ladders on the sides of cars can be considered general practice, and recommends for new construction and cars requiring heavy repairs the following:

Cars with projecting end sills: That one ladder be located at each end of car about 16 in. from center of car to center of ladder, the ladder sides to be made of hard wood and to be not less than 1½ in. by 4¼ in., the bottoms to rest on end sill or end sill plank and to be secured with not less than three ⅝-in. bolts on each side, the ladder to be not less than 18 in. wide and to have at least 4 in. clearance between the ends of the car

and the steps, the number of steps to be such that the maximum distance from center to center of steps shall not exceed 15 in. The steps, if of wood, to be not less than 1½ in. by 2 in., with the corners chamfered and let into the sides and secured by ⅝-in. button-head bolts; for iron steps, the iron to be not less than ⅝ in. in diameter, and to be secured by not less than ½-in. bolts.

For cars not having projecting end sills, the committee recommends that the ladders be located on the end of the car, in accordance with the present M. C. B. standard, ladders to be made in the manner given above.

For roof hand hold, the committee recommends that a hand hold not less than 11 in. or over 22 in. from center to center, made of ⅝-in. round iron, flattened at ends, and secured to the roof of the car by four ⅝-in. bolts, and with wrought-iron washer under roof board when secured to roof boards only; when secured to roof framing one ½-in. bolt at each end may be used, the grab iron to be located crosswise of the car not less than 7 in. from the edge of the roof board and immediately over each ladder.

It is the opinion of the committee that on account of the reduced clearance with the wide cars, while running or standing on adjacent tracks, either main tracks or in yards, that the end ladder is preferable to the side ladder.

The report was signed by D. F. Crawford, A. E. Mitchell and H. D. Taylor.

The report was accepted and ordered to be submitted to the Committee on Standards to be considered next year.

Steam Connections.—The report of the committee (see *Railroad Gazette*, June 26, page 733) was read and accepted without discussion.

Tank Cars.—No formal report was presented. Mr. A. W. Gibbs (Penna. R. R.), Chairman of the committee, made a progress report. He said that certain roads have issued circulars in regard to the acceptance of tank cars, fixing dates. The American Railway Association has fixed dates for certain work, such as the strengthening of the underframing of wooden cars. He recommended that the M. C. B. Association take no action, as the American Railway Association had already acted. Certain circulars have already embodied recommendations in regard to the size of axles based on the gross weight the cars are expected to carry. Those circulars will, as they stand, work a manifest injustice to the owners of tank cars, because should they comply with the recommendations of the circulars, no road removing those axles would be bound to replace axles of the same kind. Therefore the Pennsylvania will waive that part of the circulars until the Master Car Builders have formulated rules applicable to all cars.

Further tests in regard to the capacity of tank cars which will be equipped with one valve or with two valves have been made. The former recommendation was one 5-in. valve for tank cars of 6,000 gals. capacity or less, but it is now thought that tank cars of 6,500 gals. capacity could be adequately operated by one safety valve. Since the last meeting there have been several cases where one or more tank cars have been exposed to fire. The cars were equipped with safety valves, and in every case the valve performed its function and discharged the contents of the car with safety and without any accident to a person. So far all the cases which have been heard from show that the action of the association in regard to safety valves was a wise one.

Mr. Sanderson (S. A. L.) asked if there had been any trouble from leakage in such designs of cars as depend largely on the tank for their longitudinal strength. Mr. Gibbs said the committee had no positive information on the point, but there was difficulty where the side bearings are too close owing to too great rigidity in the tank in running around curves. Steps are being taken by the car owners to remove the difficulty.

Mr. C. M. Bloxham (Union Tank Line).—A number of railroads besides the Pennsylvania have raised the requirement for axles on tank cars, to become effective July 1st. It is a pretty serious matter, affecting 20,000 or 25,000 tank cars. The Union Tank Line measured up several hundred of its tank cars and found that in nearly every one of them, if that ruling became effective, it would be required to change those axles and put in new ones, larger than is required under the existing rules of interchange. How will we or how will you be benefited by our putting in a larger axle, if there is no rule to keep it there? The railroads that have issued circulars requiring a larger size axle under tank cars than the rules of interchange call for should await the action of the association in connection with the arbitration committee report requiring larger size axles under our freight cars. When that time comes, if we put in a larger axle for the maximum load capacity of a car, we know it will stay and not be taken out and replaced by a smaller axle, which we will have to take out the next time the car comes to our shop, and put in a larger axle.

Repairs of Steel Cars.—The recommendations of the committee were accepted and were referred to letter ballot.

Stenciling of Freight Cars.—Mr. H. M. Carson (Penn. R. R.), Chairman of the committee, presented the report, adding that the committee had conferred with the Master Painters' Association, and the report is practically in line with their recommendations regarding the adoption of a Roman letter and the heights for the various letters.

On motion, the report was accepted and referred to letter ballot as recommended practice.

THIRD DAY'S PROCEEDINGS.

Rules for Loading Long Materials.—There was a majority and minority report on this subject. In order that it might be submitted to letter ballot this year the committee got together during the convention for the purpose of harmonizing the majority and minority portions. The revised report was then presented to the convention by Mr. Alex. Kearney (N. & W.), chairman of the committee, who indicated the changes that had been made. On motion, the amended report was accepted for submission to letter ballot.

Safety Chains.—The report was presented by Mr. Sanderson (S. A. L.), chairman of the committee, who said that inasmuch as it was too late to consider any change in the rules of interchange, he would suggest that the recommendation to modify Rule 75 of these rules be referred to the Arbitration Committee.

Mr. Schroyer (C. & N.-W.) asked why two sizes of chains had been recommended.

Mr. Sanderson—When double loads are interchanged, chained up, one or the other of these chains should be used and billed for. That leaves each road open to use chains, of any size they think necessary for their own safety, and if they do not have such an agreement, with the roads with which they interchange business, they can remove any chains not standard and apply the standard chain.

Mr. Schroyer—Is it not the practice that roads generally use their own chains? If we want to chain up a load delivered to us, we can do so. We require the road delivering the load to change the chains.

Mr. Sanderson—That is not the general custom although it prevails. There are many roads which desire to interchange chains to save trouble in the yards. There are a number of cars built upon which a 1-in. chain cannot be used—there is no room between the bolster—and in that case it is necessary to use a ⅞-in. chain. Other roads insist upon a 1-in. chain.

Mr. Jas. Macbeth (N. Y. C.).—The reason for getting a standard chain is that one company would not be quarreling with another about the different amount of iron used in the construction of the chain.

A motion to submit the recommendations of the committee to letter ballot was carried, as was also a motion to continue the present committee to investigate safety chains during the current year, in accordance with its suggestions.

The Secretary then read a resolution drafted by the Executive Committee with reference to the discussion of the previous day on what action should be taken in regard to the refusal of certain railroads, parties to the Rules of Interchange, to abide by the decisions of the Arbitration Committee. The resolution was as follows:

Whereas, It has been brought to the attention of this convention that certain railroad companies which are now members of this association have declined to pay bills rendered against them by the owners of cars destroyed by flood on their various lines; and,

Whereas, The action of said railroad companies is in direct opposition to the decisions of the Arbitration Committee that said railroad companies are liable to the owners for the loss of said cars; and,

Whereas, This association has by its action in this convention sustained the decisions of its Arbitration Committee:

Be, and it is hereby Resolved, That the owners of the destroyed cars shall formally render bills for the value of the cars, and that upon receipt of such bills the railroad companies responsible for the loss of said cars under the M. C. B. rules and the decisions of the Arbitration Committee shall pay the bills so rendered or notify the owners of said cars of their intention to assume the responsibility for the payment of the bills within sixty days after the receipt of said bills.

And it is further Resolved, That if payment of said bills shall be refused, or if the said railroad companies decline to assume responsibility for the loss of said cars, then and in that case the membership in this association of the railroad companies which refuse to pay such bills, or to acknowledge responsibility therefor, together with all of the benefits of the M. C. B. rules of interchange in which they have participated, shall cease and determine.

Mr. W. E. Symons (Kansas City Southern) spoke against the adoption of the resolution. He said:

The interests involved in this controversy recognize, first, the fact that the rights of the members of the Master Car Builders' Association are limited and defined by articles of agreement which constitute a contract between themselves and the liability of these companies as between themselves depends upon this contract, and not upon the general rules of law. Therefore, their liability is not ordinarily measured by the rules of law. The managers of the Kansas City lines, however, were well within their rights in declining to submit to the arbitration of this Association a matter involving questions so widespread in their ultimate results—involving issues out of the jurisdiction of the mechanical department officers and facts not coming within their knowledge. In view of the large interests in directions other than those which would come under the control of the mechanical department and a long line of unbroken precedents in their favor, it

would seem that the position taken was a correct one from a legal standpoint, that it was not in conflict with the underlying spirit of this Association, and was dictated by the best consideration of public policy.

The question at issue really resolves itself into an interpretation of what comes under the Master Car Builders' code of rules. It is not a question as to whether the roads out of Kansas City are willing to abide by the decisions of the Arbitration Committee as understood by them, but it is a question as to the scope or jurisdiction of this committee. The executives of these roads take the position that these were cases beyond the scope of the work of the Master Car Builders' Association, involving questions of policy, which are not to be determined by ourselves.

Yesterday on the floor of the convention Mr. Hennessey made a comparison of the Johnstown flood with the Kansas City case. The Johnstown flood, while disastrous in its results, was not such a flood as the Kansas City flood, and was not brought about under similar conditions to the Galveston flood, the St. Louis cyclone, or the Kansas City flood, in that the catastrophe was the result of the failure of the work of man and not an act of Providence. We have no information or knowledge that there has ever been a storm or constant rain in the Conemaugh Valley of sufficient magnitude to cause such a flood as was experienced there, had it not been for the failure of a device of man, therefore that is not a fair comparison.

In reference to the liability of the roads under the rulings of the court, I will say that trial courts have frequently rendered verdicts against railroad companies and other corporations that were afterward reversed. Something over a year after the Galveston flood, I was called on to pay for some cars lost at that flood. The case was taken into court, and the trial court rendered a verdict for the plaintiff. The higher court promptly reversed that verdict on the ground that they were Providential acts, beyond the power of man to control; beyond the power of man to foresee, and beyond the power of man to control if he did foresee them. In overruling the trial court, the higher court used the following language:

"If the carrier, after becoming aware of the storm, and the impending danger to the goods, could, by the exercise of such care as a man of ordinary prudence would have exercised under like circumstances, have protected the goods from the consequences of the disaster and failed to do so, the carrier is liable, notwithstanding the storm itself was of unprecedented violence, and could not have been foreseen at the time of the negligent delay, and when a delivery by the exercise of due care, was possible. * * * The storm in question was of such unprecedented fury, resulted in the destruction of such a vast amount of property and in such an appalling loss of human life, that it attracted the attention of the entire civilized world. The court may, therefore, assume judicial knowledge of the fact that it occurred as well as its nature and extent. This being true, we may safely proceed on the assumption that when the people of Galveston awoke to a realization of their danger they gave small thought to the danger threatening senseless chattels, and turned their attention to saving their own and other human lives. In such a situation it will be scarcely contended but that the most prudent man would have busied himself with looking to the welfare of his family and friends, and in deference to such a paramount duty he would have postponed the safety of his most precious chattel. The defendant, though a corporation, must have exercised the care demanded through human agencies. Its officers, clerks and draymen, were human beings and all alike subject to the impending calamity. For the reasons given we hold that the proof taken, though strongly in favor of the plaintiff, wholly fails to present the issue of liability on the part of the company, and that the trial court should have directed a verdict for defendant. The judgment of the trial court is accordingly reversed and here rendered for defendant."

The claim has been made that it is difficult to draw the line of demarcation as between causes of this kind and others of a more trivial nature that would not probably come under this head, and this contention was said to be made on good ground. In almost all civilized countries the plea of acts of Providence is admitted in the courts. It is recognized by our courts, the bulwark of our Government, and no association of men, in my opinion, can stand if they transact business on a basis that is in direct conflict with this underlying principle of law. As an illustration: In England, where the plea is used and admitted, a passenger on a railroad train with a ticket in his hand sat near an open window and a gust of wind blew the ticket out of the window. The passenger declined to deliver a ticket, refused to pay his fare, and made the plea that it was an act of God, because the wind blew the ticket out of the window. The case was promptly taken before a trial court; the defendant was ordered to pay his fare, and the court promptly punished him for blasphemy. The line of demarcation in the matter under consideration is not obscure; neither do I think it would be necessary for us to have on the Board of Arbitration a man, individual or a power that controlled the laws of the universe. Such questions, in my opinion, might be referred to a proper authority on meteorology, as it comes within their jurisdiction, but it seems to me that in view of all the precedents established, the fact that this Association practically indorsed the position taken by the roads which declined to pay for the loss of cars in the St. Louis cyclone and the Galveston flood, not only has paved the way, but practically invited similar action on the part of the roads out of Kansas City. The flood at Kansas City was a parallel to the calamities in the cities just named, but it is not a parallel case to the Johnstown flood, as in the latter case there was a failure of a human agency—the failure of a human device contributed to the direct cause of that calamity.

I believe that the Arbitration Committee practically indorsed the action of the roads with reference to the Galveston and St. Louis catastrophes—if they did not do it in an affirmative way, they certainly did it by remaining silent—and the calamity in Kansas City having been of a similar nature, the lines there proceeded on the same basis; and it is wrong now to reverse yourselves in this matter and practically change the attitude of the Association on this subject.

In the preface to the rules it says: "Railroad companies handling cars are responsible for damage done to any car by unfair usage, derailment or accident." This is ambiguous and not wholly clear. It inferentially says there are other causes of damages to cars for which the companies will not be held responsible. What are the causes? They are acts of Providence, and cannot be anything else. The rules practically say that the railroads in such cases will be relieved from responsibility, as the law says no man will be held to perform impossible duties. With the rules reading as they do and the past rulings and precedents and action of this body, it seems to me that the lines out of Kansas City are well justified in the position they have taken.

The interests involved at Kansas City, are of considerable magnitude. There is an aggregate of 52,000 miles of railroad represented in this Association from Kansas City. In other words, the lines which have agreed upon the line of action to be followed in this case represent 274,000 cars, a large percentage of the membership of this Association. And it seems to me that if the Arbitration Committee or this Association felt that the past action in the case of the Galveston flood and the St. Louis cyclone was wrong, they should have proceeded to modify the rule and to have so notified their members. I contend that in the position we have taken we are proceeding on good grounds, and I do not think the resolution offered to this convention should prevail. You will be adding to the friction that has now sprung up as the result of this and in regard to which we hold we are entirely faultless as we have followed the rules and precedents established. We have not deviated one iota from these precedents.

It has been urged that we have used discrimination, that we have preferred creditors. I deny it. Of all the cars that were lost we have paid for some. We had a bridge across the Kaw river and when the bridge was in danger, and before the water was so high that we were shut off from access to it, we took a switch engine and put a cut of cars on the bridge to try to hold it down. The bridge was destroyed and the cars went with it. We felt a sense of responsibility in this case for the reason that we took these cars and used them to try to save the bridge, and we promptly paid the bills for these cars, but had they stood on the tracks where they stopped in the regular ordinary traffic of interchange and been swept away by the storm which we were powerless to foresee or guard against we would have declined to pay the bills.

Mr. Symons' views were reiterated by several other members of the Association, representing roads entering Kansas City. Mr. C. D. Pettis ('Frisco System) did not think the General Managers' Association had intentionally repudiated the rules but that their decision was taken as affording the means of settlement for damage, chiefly among the roads interested, with the least controversy and expense. He was not in favor of the resolution as being entirely too drastic. Mr. C. A. Schroyer did not see any object in inflicting a penalty of expulsion as it could only do the Association harm and bring about no good. The attitude of the Association in the matter had already been clearly defined and he was in hopes that some agreement could be reached without committing the Association to a radical step on which there was much doubt as to the right under its constitution. Mr. Hennessey stoutly defended the Arbitration Committee and made a strong plea for the adoption of the resolution as presented. He considered this one of the most serious dangers which had ever threatened the authority and existence of the Association. Mr. R. P. C. Sanderson, as the seconder of the motion for adoption of the resolution, moved to amend the resolution by omitting the penalty clause of expulsion and the resolution as amended was adopted.

Draft Gear.—In the absence of the Chairman of the committee, the secretary read the report. There was no discussion. The recommendation of the committee to increase the drawbar side clearance was referred to letter ballot. On motion, the committee was continued, with instructions to confer with the Coupler committee.

Guarantee for Cast Iron Wheels. — Mr. Garstang (Big Four), Chairman of the committee, presented the report. It was moved that the report be accepted and a standing

committee appointed to report next year.

Mr. R. P. C. Sanderson (S. A. L.).—I would suggest that the committee send out copies of this proposed guarantee to the different railroad companies, with a request that the mechanical officers of those companies should seriously take it up during the year with the idea of ascertaining from their wheel performance and wheel records how it would affect them, so that they can come to the convention next year prepared to discuss it fully and to act on it intelligently, and also be able to advise the committee with regard to it by the 1st of March next, say.

Mr. Wm. McIntosh (C. R. R. N. J.).—It will be conceded, I believe, by railroad men generally, that some corrections or alterations should be made in the system of guarantees that is now in force. I think it is quite evident that it is too rigid, and I believe that we get exactly the kind of wheel that we pay for. In other words, if the wheel makers are surrounded by such restrictions that there is no profit in their output, they will be forced to economize by every means possible.

The motion to refer the matter to a standing committee was carried.

Mr. Garstang.—It seems to be a general practice on quite a large number of roads using ten-wheel and consolidation engines to set some of the tires on those engines in an 1/8 in., or more closely than the M. C. B. limits. If railroads can afford to run their locomotives with 20,000 and 25,000 lbs. weight on each wheel at high speed, 1/8 in. closer than the prescribed gage, it seems to me that we could well add 1/8 in. to the car wheel. I would move that it is the sense of this Association that that can be done with safety and without any detriment to the track conditions, and that we all should go back home and lay the matter before our general managers, with a view to getting permission to add 1/8 in. to the flange.

Mr. Sanderson.—I do not believe we are all of us prepared to endorse that. That narrows the distance 1/4 in., and I do not believe this convention ought to express itself quite in that form at this time.

Mr. F. H. Clark (C., B. & Q.).—I agree with Mr. Sanderson that the question of an increase of the thickness of our wheel flanges is a matter that ought not to be taken up by us at the present time. That matter was gone into very carefully a number of years ago by this association and by a number of the railway clubs, and it was generally conceded that it was not advisable to make any change on account of the conditions of track. It may be that track conditions have changed, and if so it may be quite possible to make the proposed increase, but I think that is a matter that ought to be gone into very carefully, and that we are not in a position to make any definite recommendations at present.

Mr. Garstang.—The locomotives of which I spoke are running the fastest trains in the country safely, and without damaging the track. Here is a chance to strengthen the cast wheel at a point where it is the weakest. If the convention cannot adopt the resolution I would ask that each one take the question up with the general manager and get permission to use the 1/8-in. and go further and ask them in making all renewals of switches, frogs, guard rails, that we open them up 1/4 in. so that after awhile if we want to make a flange 1/4 in. thicker we can do so; this can be done without any additional expense to railroads and without danger. I think we should work on that line.

Mr. R. L. Ettinger (S. Ry.).—Thickening the flange on the outside 1/8 in. amounts to about 1/16 in. on the line of the wheel tread. A wheel mounted that way with our present guard rails and switches would have the same effect as a rail at the present time worn 1/16 in., or a flange worn 1/16 in. It doesn't throw the throat closer to the rail, but throws it farther from the rail; in other words, the inside of the flange strikes the guard rail at the present time; the flange itself will not strike the rail on the opposite side. If we have a wheel with a flange worn 1/16 in., we are 1/16 in. away from the rail. If we add 1/16 in. to the flange we are still 1/16 in. away from the rail on the opposite side. The tires of locomotives on a good many roads are now set 53 1/8 in., 53 1/4 in., and 53 3/8 in. on consolidation and ten-wheel engines. The roads I am connected with have a good many hundred engines that have tires set that way. It is the recommended practice of the Master Car Builders' Association that they be set that way. It is a crooked road but we do not have any trouble.

Mr. Garstang's motion was amended to provide that the committee take into consideration the full contour of the wheel, and that they be empowered to confer with the committee of the American Railway Association in relation to the contour of the wheel in relation to the track, the amended motion being adopted.

Doors.—In the absence of the Chairman the Secretary read the conclusions in the report. He also read a communication emanating from a committee of the Association of Railway Special Agents of the United States and Canada, on car doors and fasteners. This communication asked for the appointment of a similar committee from the M. C. B. Association, in the belief that a discussion by the men whose duty it is to catch thieves and those whose duty it is to design and perfect the doors and fastenings might result in making it more difficult for thieves to ply their trade.

The communication was referred to the Executive Committee, and the report of the committee adopted.

Subjects.—The report of the committee was accepted and referred to the Executive Committee.

After hearing the report of the committee on resolutions and disposing of some unfinished business the meeting proceeded with the election of officers for the coming year and then adjourned.

Topical Discussions.

Riveting Yokes.—Is not the method now commonly followed of securing yokes to couplers with rivets from 1/16 in. to 1/4 in. smaller than holes, unmechanical and ineffective? Should we not ream the holes to a good alinement, use rivets to fill them, and bead rivets from opposite sides, to insure filling them on one side at least? Is there any sense in making heavier drawbars, followers and cheek plates if this system of riveting spring yokes is to continue?

Mr. Wm. McIntosh (C. R. R. of N. J.).—We are trying hard to strengthen our draft gear and it is of but little consequence if we provide a steel drawbar of increased dimensions and connect it to a yoke with an insufficient fastening. Good holes should be provided, rivets should be of the proper dimensions to fill the holes, and they should be riveted in place in a secure and workmanlike manner.

Mr. Wm. Garstang (C., C., C. & St. L.).—I move that it is the sense of this association that all holes in drawbar yokes and drawbars be drilled.

Mr. J. F. Deems (N. Y. C.).—With the increased power of locomotives, the increased length of trains, and the increased weight of cars, we have not kept pace in our M. C. B. coupler. For a good many years past we have not devoted enough attention to it. We should not only drill the holes, but we should machine the knuckle and those parts, and I believe the time will come when we will do it. But for the time being it seems to me we should not delay for one day the drilling of the hole in the shank of the coupler and the yoke, so that when we put the rivets in these places we will get a good fit, which we do not and never will get so long as we core the holes.

Mr. R. P. C. Sanderson (S. A. L.).—The attachment of the pulling device to the body of the car should be so constructed that the knuckles should break first, the coupler second, and the attachment to the yoke third; the yoke next, and then the draft rigging.

Mr. W. E. Fowler (C. P. R.).—We have discovered that the effective attachment of a coupler to the pocket depends on the close contact of the gib on the yoke, to the coupler, and we have been paying much attention to seeing that the gibs are properly fitted. The cases are rare where such draft rigging has given way. We depend on the rivets mainly to keep the gib in proper and close contact with the shoulder on the coupler.

Mr. W. F. Bentley (B. & O.).—Too much dependence should not be placed on the lip or gib. I have seen some couplers made with a lip on the yoke on either side of the boss on the coupler shank to take a portion of the buffing as well as the pulling strain, in which a good fit had been made, and they still sheared the rivets off. The drilling of the holes will be a step in the right direction to insure a better fit of the coupler rivet in the coupler shank; but the rivets should be increased in diameter.

Mr. F. H. Clark (C., B. & Q.).—I do not feel that we would gain very much by reaming the hole in the coupler shank unless at the same time we made some other change in the method of applying the rivet or applying the yoke. If the connection ought to be a rigid one, we have either to fit a bolt or put in our rivets in a different way from what we are doing. One end of the rivet is heated and as a result you get tension on it in such a way that on one side of the yoke you have a fit of the rivet in the yoke, and possibly also in the coupler, but unless we heat the whole rivet we cannot assume that we are going to have a tight joint. I don't know that we ought to have a rigid connection between the coupler and the yoke. I think a flexible connection of some sort would be preferable.

Mr. H. F. Ball (L. S. & M. S.).—I have had some couplers made with pockets using a 2-in. pin; the boss on the coupler shank being made radial with the center of the pin, and a lip is provided top and bottom on the pocket to give a bearing surface in addition to the pin bearing. The pin gives about twice the bearing area of two rivets.

The matter was finally referred to the committee on couplers, with instructions to prepare designs and specifications for attachment, and report next year.

"The Best Method of Preventing or Minimizing the Damage to Metal Parts of the Right of Way from Salt Water Drippings."

Mr. C. A. Schroyer (C. & N.-W.)—A short time ago our chief engineer brought up the subject with the mechanical department regarding the prevention of the discharge of salt brine along the road, which he has found rusts the metal parts of bridges, etc. I at once addressed a circular letter at some length to the heads of the mechanical departments of different roads requesting them to advise us what experience they have had in that line. I found almost invariably where the matter has been submitted to the engineering department that there is more

or less trouble from the rusting of these parts by the salt brine.

I asked the refrigerator companies if they ever considered anything to prevent this. They have not, so far as I have been able to find out. It occurred to me that it would be possible to have an auxiliary tank on these cars for the storage of the brine, allowing the water from the melting ice to drop into that tank, the tank being large enough to carry the car from one terminal to another.

Mr. W. E. Symons.—Inasmuch as steel underframing is coming into general use in car construction, I think any formal investigation which may be made into this subject should include also the effect on car bodies as well as on the track, bridges, etc.

"The Establishment of a Standard Height from Top of Rail to Center of Drawbar for Passenger Equipment Cars."

Mr. T. H. Curtis (L. & N.).—The height of drawbars and platforms for passenger equipment is more or less defined by the prescribed height of the couplers for freight cars; 33 in. being the standard height, with 1½ in. above and below, as the maximum. But we cannot successfully run our passenger cars with such a great variation as 3 in. in the height. I think we should determine more definitely what should be the maximum height for our passenger car platforms. The question came up on our road in the case of some cars which we raised to 34½ in., and another road put them down and said that we had raised them too high. I do not know what height to make them.

Mr. W. E. Fowler (C. P. R.), said that on his road in the winter the wear of coupler knuckles is increased enormously when the height of couplers is not uniform. Mr. Hennessey (C., M. & St. P.) thought it would be impossible to hold passenger cars within a 3-in. limit, as for freight cars. Loaded baggage and mail cars, for instance, would have a spring compression amounting to more than that. He thought the solid knuckle would permit greater variation than when the open knuckle was used. He suggested the appointment of a committee on the subject. Mr. F. M. Whyte (N. Y. C.) stated that the New York Central some years ago established as a standard 51-in. from top of rail to top of platform for express cars and 50-in. for passenger cars.

Mr. Curtis.—There is another point to be considered. There is a very short distance between the top of the coupler knuckle and the bottom of a diaphragm, and we find the latter riding on the former, making it necessary to use countersunk pins. I do not think we could allow a variation of over 3 in. and not have trouble from the diaphragm riding on the coupler.

Mr. W. G. Wallace (D., M. & N.).—The principal difficulty is with the height of the platform, in establishing a standard height above the center of the drawbar. With the centers of the drawbars 33 in. above the rail, the platforms will vary from 15 in. to 20 in. above this, and that is where we get into difficulty in coupling to other cars. A standard height of the platform above the center of the drawbar should be established.

Mr. W. P. Appleyard (Pullman Co.).—The most important factor in passenger car heights, as regards the couplers, is that of the platform itself. The height of the platform should be established by measuring from the rail in all cases, so that the passage from one car to another will be as nearly uniform as possible in height. That is the first consideration. Then measure down from the top of the platform to the center of the coupler to establish the proper height of the coupler.

Mr. W. E. Fowler (C. P. R.).—Cars that carry passengers are in a different class from those that carry mail and express. We can permit the latter in operation within reasonable limits, but the passenger car should have a standard set for it.

The motion of Mr. Hennessey to refer the subject to a committee was carried.

"Is it Advisable to Use Malleable Iron for Wearing Surfaces?"

Mr. T. A. Foque (M., St. P. & S. S. M.) sent a written discussion as follows:

The use of malleable iron for wearing surfaces has been somewhat limited, but a general answer to the question would be, No. Owing to the softness of the metal, the abrasion is very marked and harder iron has longer life. This can readily be seen in passenger car journal boxes where after a few months' service holes are worn through the sides of the boxes, and such surfaces are now protected by steel wearing strips. For parts subjected to a lesser degree of motion, such as center plates, side bearings or draft gear, the malleable iron will prove satisfactory if properly designed, care being taken to so proportion the wearing surfaces as to keep the load per unit of surface and the fraction within safe limits.

While malleable iron may furnish a fairly satisfactory wearing surface under favorable conditions, the general tendency is to restrict its use to purposes for which, as a substitute for cast-iron, its greater strength makes it particularly valuable.

"How Does the M. C. B. Cast-iron Wheel Show Up in Service as Regards Breakages of Flanges."

Mr. R. L. Ettinger (Southern) opened the discussion. The 1904 cast-iron wheel has not been in service long enough to state that the design is perfect and will remedy all defects in former patterns, nor was it claimed by the committee presenting it that they believed it to be the only design that would give good, satisfactory service; but the 1904 wheel was presented as the best they had to offer by a very representative committee of this associtaion, ably assisted by a committee representing a majority of the largest wheel makers in the United States. These manufacturers must be satisfied that they are on the right track, as I have recently heard from a number who are now prepared to furnish this design, one writing that the 700-lb. pattern was made shortly after the convention last year and a great many thousand wheels from it put under cars of 100,000 lbs. capacity from which they have had practically no complaint.

The company with which I am connected put 8,000 wheels from this design in service last winter under 100,000-lb. steel coal cars. These cars are operating on some very heavy grades, and up to the present time we have not had any failures. Of the lighter wheels for 60,000-lb. cars we have a larger number running.

On a road in the west they had a number of very high coal cars that were giving a lot of trouble from breaking wheels, and it was decided to try the new M. C. B. design. The wheels were changed under some 200 cars, and I am told that none of the new wheels has failed. In this same connection and leading up to the change there were some tests made at Purdue University of types of wheels in general service and wheels made from the new M. C. B. pattern. All of the results were in favor of the new design.

The breaking of flanges will be reduced to a minimum for cast-iron wheels by the addition of ⅛ in. more metal on the outside. This increase will amount to but little more than $^1/_{16}$ in. on a line with the wheel tread, and this will not affect guard rails set at 1¾ in. any more than a driving wheel having the common distance of 53¼ in. between flanges, or a car wheel and rail that have a combined wear of $^1/_{16}$ in. The co-operation of our road departments could very rapidly bring about the same relative conditions that now exist.

On going into this question very carefully with our engineering department we could not find any objection from their point of view to making the change in the wheel and using them on the tracks as now laid, or on their part to increasing the clearance between main and guard rails to 1⅞ in. on all new or repair work, and this has been decided on.

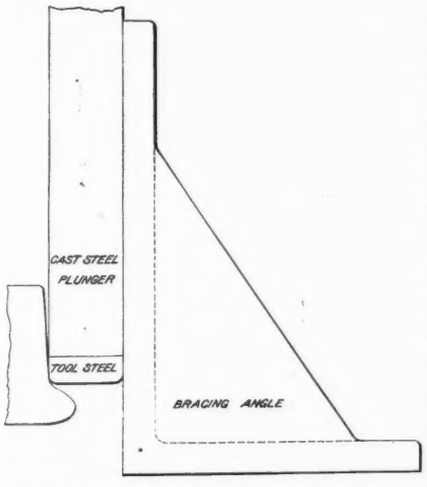
We took this matter up with our engineering department with some hesitancy, because there had been so much said about the objections we might expect to meet with, but in place of objections found a perfect willingness and desire in that department to do anything the mechanical department asked with the view of better wheel service and fewer failures.

Mr. Geo. L. Fowler.—I have not had the privilege of having had charge of any cars of 100,000 lbs. capacity using cast-iron wheels, but I have been commissioned on two or three occasions to look into the service of cast-iron wheels under various conditions. The position, it seems to me, as it stands today, is that there is an uncertainty in regard to the advisability and the safety of using a cast-iron wheel under a car of 100,000 lbs. capacity. Under a 60,000-lb. capacity car there is no doubt whatever but that it is all right. Under an 80,000-lb. car they seem to think that it is just about on the verge of the upper limit. With regard to the 100,000-lb., the general sentiment, as I find it through the community, is one of doubt. To remedy these defects, changes have been made in brackets, in the location of the plates and the thickness of the metal, in order to strengthen the wheel, and these have been to a certain extent successful, but there have been a number of cracks, and some very peculiar cracks, developed in action on mountain roads. It has been found that the brake action in heating the wheel is apt to produce an internal crack that no inspector can see, and it works its way to the outside, breaking in detail, as though there were an inherent defect in the wheel as it came from the foundry, while it is really due to the brake action, because the same thing has been reproduced by subjecting a wheel to a thermal test; not the thermal test with a thick band of metal, but with a thermal test of about ¼ in. of molten iron, heating it about as the brake shoes would heat it, and reproducing an internal crack which cannot be seen by any kind of an inspection.

Now, with regard to the strength of the cast-iron wheels: Professor Goss, at Purdue, recently took some cast-iron wheels and put them in his testing machine, laid them flat and forced a square pressure bar down against the flange, holding it in place so that it could not back off, with some rollers to overcome the frictional resistance between the bar and a supporting angle back of it; and with the he pushed the flange down off the wheel. He told me the other day that a normal wheel broke at 70,000 lbs. pressure. I heard of this a few weeks ago, and thought I would like to corroborate those figures for myself and try to ascertain the relative strength of a steel-tired wheel or a steel wheel. I wrote to Prof. Goss, asking him if he thought that he could do the work on his testing machine, and calculated that it ought to take about four times or four and a half times as much pressure to push off the steel flange as a cast-iron flange. I based my calculation on the comparative tensile strength of the metals, which for cast-iron wheels runs from

28,000 to 30,000 lbs. and for the steel tire runs from 112,000 to 125,000 lbs. I made some tests a short time ago of the tensile strength of steel tires and found that they broke at from 112,000 to 113,000 lbs. per sq. in. Similar specimens from the tread of the Schoen steel wheel broke at stresses ranging from 118,000 to 123,000 lbs. per sq. in.; so that there is not much difference between the two.

Professor Goss said he was unable to do the work in his machine, so I requested the Schoen Steel Wheel Company to lend me their press, which has 1,000 tons capacity; I procured a cast-iron wheel that the makers knew I was going to use for that purpose, and they sent me one that was a little thicker on the flange than the law really allows, with a chill that measured about ⅛ in. in the throat, so that there was a backing of good solid gray iron in behind there to stand the stress. My figures on that are not, of course, absolutely accurate, because I was working on a large press where I had to allow for the weight of the head and also for the frictional resistance of the packing, but as the frictional resistance of the packing has been pretty thoroughly worked out, there is probably not much error in my figures. The method used was to bolt the wheel firmly to the base of the press and to force a plunger bar down against the flange, as shown in the engraving. The bar was prevented from backing away by a stiff angle bolted to the bed, the rubbing



Sketch Showing Method of Breaking Wheel Flanges in Testing Machine.

surfaces between the two having been well greased. This is essentially the same method as that used by Prof. Goss. I broke the flange of that chilled iron wheel at a pressure of 116,000 lbs., and it fractured silently with no apparent recoil. The flange of the Schoen steel wheel broke at 526,000 lbs., showing that there is not very much difference in the relative value of the strength of the flanges and the tensile strength of the metal that was in the wheels. In the case of the cast-iron wheel under consideration, I did not measure the tensile strength. At the present time I am engaged in an investigation to ascertain what the vertical stresses are on a wheel, and I would suggest that we are very much in the condition of a man who would attempt to build a bridge without knowing anything about the load that that bridge was going to carry. You are running your wheels at all kinds of velocities, with all kinds of loads, over all kinds of tracks, and there is no one that knows anything at all about what the actual flange stresses are. If the flange of a cast-iron wheel is only worth 70,000 lbs., which Professor Goss tells me is the normal stress, it looks to me as though we were running very near the danger line when we are putting it under cars of 100,000 lbs. capacity, high, as these cars are when loaded away up higher than the old box car used to be, hauling them over all degrees of curvature and all kinds of track, without knowing anything at all about the stresses to which we are subjecting them. I would suggest that it would be a very appropriate thing for this association or some railroad or combination of railroads to investigate what the horizontal stresses are on a wheel when it is in motion. The matter would not be a very serious one either in time or expense and would certainly serve to cast light upon a subject which, at the present time, is shrouded in darkness.

Do We Need Greater Braking Power on Freight Cars?—Mr. F. M. Gilbert, New York Central, opened the discussion.

A proper consideration of acceleration and velocity, the prevailing higher speeds and heavier trains and the necessity for faster schedules, suggests that it is time that we look at the question of retardation and devote some time and thought to the question of how to absorb the energy of our high-speed heavy freight trains in less time than is now possible with the braking power we are using.

In view of the existing conditions the writer cannot see that any arguments are required to show that we do need greater braking power on freight cars.

From the crude state of the air brake apparatus it is useless to describe the ideal conditions—where the braked power should automatically change with the loads carried by the car. So far as the writer's knowledge goes, no apparatus has as yet been developed that will accomplish this satisfactorily. We must therefore confine ourselves to getting the highest safe percentage of the light weight of the vehicle.

The matter then resolves itself into the questions:

1. Can we provide greater braking power on freight cars without introducing complications that would be detrimental to the equipment?

2. If we can provide this increased braking power without detrimental effect upon the equipment, how can it best be done cheaply and with the fewest complications?

The general practice to-day is to brake freight cars to 70 per cent. of their light weight. This 70 per cent. when corrected for the cylinder effect absorbed by the brake gear will be reduced practically 20 per cent. We therefore arrive at the point of application of brake shoes with 80 per cent. of 70 per cent. of the light weight of the car, which is 56 per cent. of the light weight of the car.

If we assume for 100,000-pound capacity cars a light weight of 38,000 pounds, we have 56 per cent. of 38,000, which equals 21,280 pounds. If we add to the light weight of the car its capacity, plus the 10 per cent. permissible overload, we have 38,000 plus 100,000 plus 10,000, which equals 148,000 pounds, and the per cent. of total weight braked is 21,280 multiplied by 100 and divided by 148,000, which equals 14.37 per cent. This braking power on a straight, level road does its work fairly well, but it is not sufficient on grades and curves, where the distance in which stops must be made is shorter.

The writer is of the opinion that freight cars can be figured to be braked at 100 per cent. of their light weight without injurious results to the equipment; this when corrected for the power absorbed by the brake gear will reduce the actual braked weight to about 80 per cent. of the light weight of the car.

The three principal factors associated with the air brake that are productive of injury to the equipment are:

1. Lack of simultaneous application and release of the brakes on the various vehicles constituting the train.

2. Lack of equal percentage of braked weight on the various vehicles constituting the train.

3. Lack of maintenance in proper repair of the air brake mechanism of the various vehicles constituting the train.

None of these factors will be affected one way or the other by the recommended increase in brake power, except the question of repairs, which will require more attention.

The benefits to be realized from the higher braking power are:

The ability to stop trains in a shorter distance; hence the ability to approach yard limits, meeting points, etc., at a higher velocity, thus enabling faster time to be made over the respective divisions.

Concerning the question of how this increased braking power can be provided cheaply and with the fewest complications:

Owing to the large number of freight cars on which the levers are proportioned for 70 per cent. at 50 pounds equalized cylinder pressure, I am of the opinion that the proper way to get the increased braking power is by raising train-line pressure the proper amount.

Our air brake friends will probably say that triple valves designed for 70 pounds train-line pressure will not work satisfactorily with higher pressures; they will also probably say that the increased leakage from train pipes under the higher pressure will overtax the pump. The answer to these objections it appears to me to be that the triple valves should be modified so as to work satisfactorily and the train pipe should be kept tight.

As the matter now stands we are not securing the results from air brake apparatus that we should.

Trans-Atlantic Passenger Travel.

In spite of the attraction of the St. Louis exhibition and particularly of the fact that there was a war of steerage rates, which went down to $10 and even less, the total number of passengers landed at New York during 1904 shows a decrease of 8½ per cent. and the number of steerage passengers a decrease of 11 per cent. when compared with the preceding year. According to *Engineering*, this is largely due to the vigilance with which the port authorities of New York investigate the status of immigrants in order to determine whether they are likely to become satisfactory citizens and not become a public charge. The figures are held to prove the success of our rules in restriction of immigration. The number of passages of cabin and steerage passengers and the total number of passengers for the last fifteen years are shown in the following table:

Record of Atlantic Passenger Service to New York.

Year.	No. of passages.	Cabin.	Steerage.	Total.
1890	...	144,178	371,593	515,771
1891	...	150,023	445,290	595,313
1892	...	120,991	388,486	509,477
1893	975	121,829	364,700	486,529
1894	879	92,561	188,164	280,725
1895	792	96,558	258,560	355,118
1896	852	99,223	252,350	351,573
1897	901	90,932	192,004	282,936
1898	812	80,586	219,651	300,237
1899	826	107,415	303,762	411,177
1900	838	137,852	403,491	541,343
1901	887	128,143	438,868	567,011
1902	922	139,848	574,276	714,124
1903	969	161,438	643,358	804,796
1904	967	162,389	572,798	735,187

One fact especially important as showing the undesirable quality of our present immigration is the distinct decrease of passengers from Northern Europe and the large increase of steerage passengers from Medi-

terranean ports. The entrance of the Cunard line into the Mediterranean, which was one of the causes of the difference between the companies leading to the rate war last year, was one reason for this increase. By an arrangement with the Austro-Hungarian Government by which steamers are run from Fiume, this company, in 1904, brought to New York 24,000 immigrants. This gives with saloon passengers, an average population for each ship of 1,225, the highest recorded by any of the Mediterranean lines this year. The lines in the International Mercantile Marine agreement, including the two German companies, carried 71.6 per cent. of the first-class passengers, 62 per cent. of the second-class passengers and 57.7 per cent. of the steerage passengers, which figures are about the same as for the previous year. The North German Lloyd leads in the number of passengers landed at New York, carrying 15,514 first-class, 21,684 second-class and 98,449 steerage during 1904. The Hamburg-American line comes next, with the White Star, Cunard, Red Star, French, American, Holland and Anchor lines following in the order mentioned. The North German Lloyd carried 22.4 per cent. of all the first-class passengers, 23.1 per cent. of all the second-class passengers and 17.2 per cent. of all the steerage passengers landed at New York. The average number of passengers per ship on the North German Lloyd was 1,201, against 1,367 in 1903; on the Hamburg-American line, 1,256, against 1,135 in 1903. It has been only within the twentieth century that the average number of passengers per ship of any line has exceeded 1,000, the North German Lloyd, in 1901, with an average of 1,130, being the first line to carry over that number.

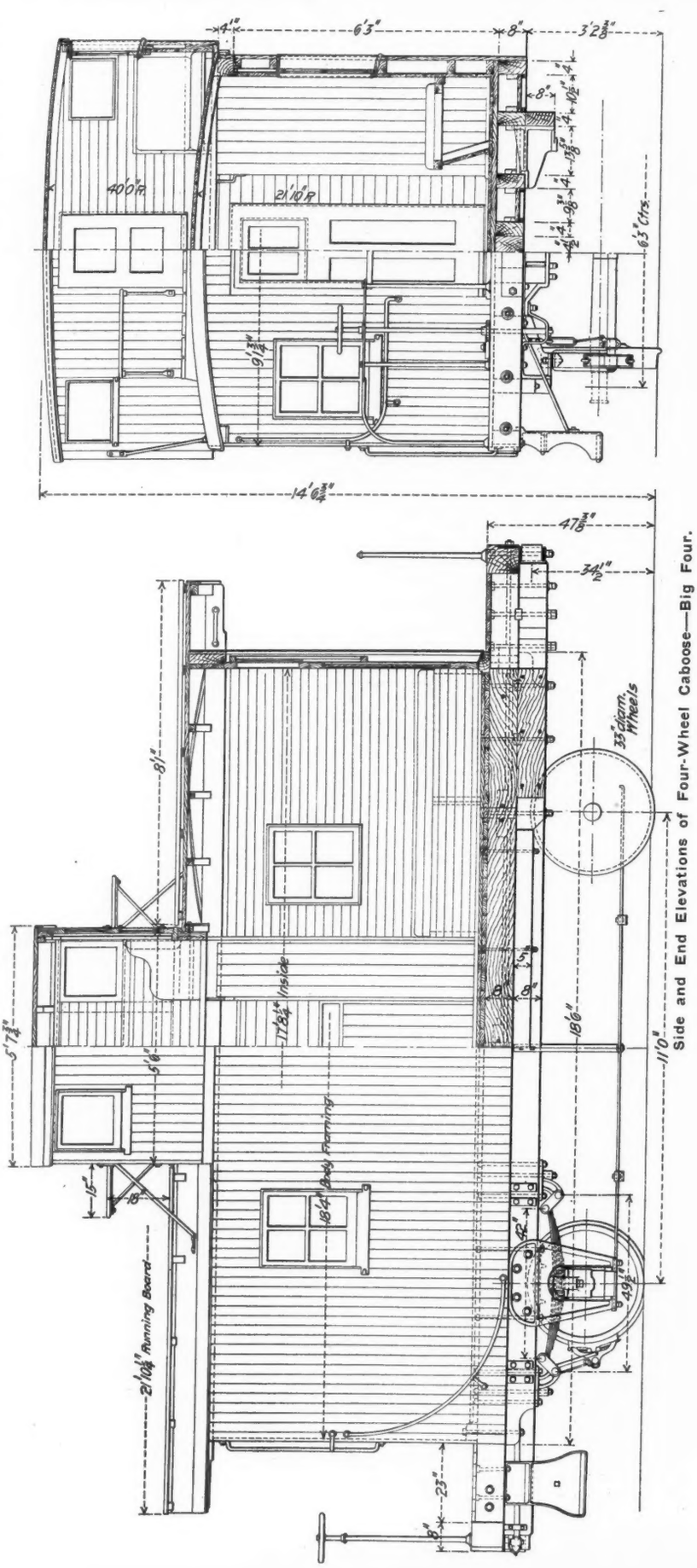
Four Wheeled Caboose for the Big Four.

The four-wheeled caboose has by no means disappeared, nor is it likely to disappear from American railroad service, especially on short division runs, though as a rule the men prefer the long car with bogie trucks as affording them more room and comfort. The Big Four, however, is building a large number of four-wheeled cabooses, upon which a great deal of time and thought has been expended in order that they may embody the maximum of convenience and comfort, and the efforts have been so successful that the men are asking for them in preference to the long cars on bogie trucks. Through the courtesy of Mr. Wm. Garstang, Superintendent of Motive Power, we are enabled to present engravings showing their construction and arrangement.

The general dimensions are:

Length of body	18 ft. 6 in.
Length over platform end sills	23 " 6 "
Wheel base	11 " 0 "
Height, platform above rails	3 " 11⅝ "
" top cupola above rails	14 " 6¾ "
" of eaves above sills	10 " 5⅞ "
Width over end sills	9 " 4 "
Width of cupola	9 " 10¼ "
Inside length	17 " 8¼ "

In the first place, it is of course necessary that the underframing of the caboose should be of the most substantial character, so that it may be able to sustain the stresses put upon it by pushing engines as well as withstand the battering that the car is sure to receive in switching operations and yard work. In order to meet this first requirement, the floor framing is made exceedingly strong, as will be seen from the end elevation, in which the sills are shown in section. There are eight sills in all, each measuring 4 in. by 8 in., while the outside intermediates which are above the pedestals are supplemented by another bolted beneath them of the same dimensions, and the space between the center sills is occupied by a filler running the whole length of the car. The draft sills



Side and End Elevations of Four-Wheel Caboose—Big Four.

are bolted to the bottom of the center sills, and though the timber itself only reaches a few inches beyond the wheel center, it is backed by a supplementary piece 5 in. deep filling the space between the two ends, so that the draft sills are practically continuous as far as buffing stresses are concerned. It will thus be seen that the whole lower framing is made as solid as seems possible

The spring suspension is old and is the same as that which has been used upon the four-wheeled cabooses of the Pennsylvania, Lehigh Valley and other eastern roads for a number of years, to say nothing of its extensive application to passenger cars abroad. It consists of a semi-elliptic spring resting upon the axle boxes; nearly straight when carrying the car body, and supporting the latter through links that permit perfectly free motion to the ends of the springs. This gives an easy motion to the car, while galloping is prevented by the long wheel base.

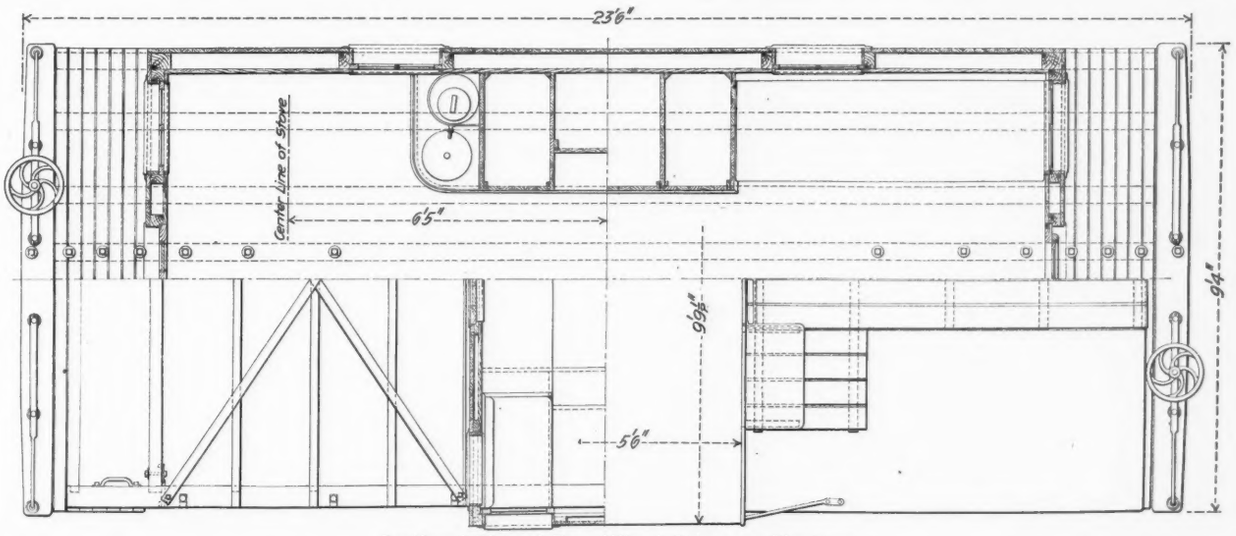
The steps are patterned after the Pennsylvania model, and give a broad, firm footing, and at the same time prevent the foot from slipping through in case of a partial misstep. The side frames are of cast-iron with wooden steps that are but 17 in. above the rails, so that even from a sloping ballast the height is not excessive.

The upper framing is of the same substantial character as the balance of the car; somewhat more rigid and thoroughly braced than is often the case but still containing no features that demand especial attention. The whole construction of the car can therefore be considered to be typical of the best practice of the day, but does not embody any striking features other than its strength.

It is in the utilization of the interior and the arrangements for comfort and convenience that, as already stated, the car is worthy of attention. The general plan is practically the same as that of all four-wheeled cabooses. There are the two trunks at each side at the center extending up to the monitor. Four spaces are left between these trunks and the ends of the car, three of which are occupied by bunks, beneath which there are lockers for the reception of heavy supplies such as rope, chain, jacks, re-railing frogs and other items needed in freight work. In addition to the lockers a canvas stretcher is stored beneath one of the bunks, and as this is formed with a strong frame and folding legs, it can be used as a cot in case it is desired to give sleeping or resting accommodations to a fourth man for the night or during a period of lay-off. The bunks are, of course, of ample length to permit a man to lie at full length without cramping. The fourth space between the trunk and the car end is occupied by a coal box and a Spear heater. The latter is arranged so that simple cooking can be done and is a most convenient caboose stove. This allows room enough at the center for a wash basin, with a closet beneath and an ample water tank above for supplying the requirements of a trip. In the trunk there is upon one side an ice box with suitable drainage and ventilating arrangements, and on the other a locker for oil and lamps. There are also three individual lockers for clothes and personal effects, with lock and key, so that each member of the crew is provided with a place to store his private property.

A folding table that can be stowed away just beneath the carlines, is available for use as a desk or for any other purpose that may be desired and a special closet for papers and documents is also provided for the convenience of the conductor.

The width is somewhat more than that of the ordinary caboose, and the monitor is carried out even beyond the sides instead of falling short by from 6 in. to 8 in. as commonly built. This makes it possible for the lookout, by leaning out of the side windows, to see down along the side of the train and note such things as loose doors or projecting stakes or lading that cannot usually be observed from the caboose. Other conveniences in the monitor are the doors at each end, opening upon the roof, so that it is possible to go directly out upon the top of the train without climbing the end ladders of a freight car, or clambering up over lading that may afford a poor footing. Finally, seats are arranged on the outside of the monitor, so that the men may remain out on the roof in pleasant weather if they so desire. This is a feature that will no doubt be appreciated in hot weather.



Sectional Plan of Four-Wheel Caboose—Big Four.

Freight Claims.*

In the main, both the shipper and carrier are undoubtedly disposed to be just in freight claim matters. We must grant to each, however, the full recognition of all the equities, in each case not forgetting those disarrangements which losses and instances of damage very often cause. A plant is idle for want of a piece of machinery, which, upon arrival, is found to be broken and unfit for use. The delay in operation of that mill causes a loss not only to the operator, but also to many who are dependent upon its product. The carrier, on the other hand, feels that his hardship has been great in the necessity for payment of the amount of loss, representing the invoice value of the article. Each party has sustained a loss—the consignee in the failure to operate his plant, the carrier in the value of the lost article. It is an equitable distribution of one of the burdens which fall to the great industrial world in its effort to promote the growth of commerce and market its output in which manufacturers and carriers are equally interested, equally benefited and equally responsible.

Nor does the duty of either party end here. We are, both shipper and carrier, working in a common interest toward a common end—the production and delivery of the greatest possible amount of business at the minimum of loss and maximum of benefit. It is, therefore, of equal interest to both that every precaution be taken from the beginning to prevent loss or damage. In this the producer has much the advantage of the carrier, for the reason that from beginning to end of the process of production the work is under control of those in authority who can ensure the proper packing and loading—but with the carrier the movement of the freight takes it through so many hands as to make it practically impossible to locate responsibility among its men for an instance of damage. The introduction of air-brakes on freight trains—a wonderful stride forward on the part of carriers, with benefits beyond computation to producer in the possibility of greater speed and quicker deliveries—has increased the carrier's burdens greatly. The sudden stops cause contents of cars to tumble one package over another in defiance of the best methods of loading on part of either carrier or producer.

The use of the automatic coupler has removed the one condition formerly necessitating care in coupling cars—the human hand—and again the best management or system for the careful handling of freight is defeated by the carelessness of trainmen and those accidents and misfortunes which attend the switching of cars in and out of trains by the most careful of trainmen. The loss and damage paid to-day multiplies that paid a few years ago many times. A certain portion of this great increase is due to the natural increase in business, but a much lar-

*Extract from a paper read before the Railway Club of Pittsburg, by W. A. Terry, Gen. Freight Agent, P. & L. E. R. R.

ger proportion is due to these steps in advance—the consequence of the use of the air-brake and the automatic car coupler.

It is therefore the duty, and should be the aim, of the producer to meet these new conditions as all new conditions should be met—by corresponding provision for safe carriage in the way of packing. It is unfortunate that all producers do not realize their own responsibility in this particular, and are to-day offering carriers freight improperly and insecurely packed and endeavoring to reduce their own expenses by increasing the carrier's risk. Failures due to error may be overlooked, but failure due to an apparent intent to take unfair advantage cannot fail to provoke resentment, and certainly a resistance as stout as it is just.

The responsibility for damage is not always easy to locate, and absolute fairness on the part of the heads in charge of the business of either the carrier or the shipper will not always solve that difficulty. Some months ago I was convinced that in the matter of handling acid carboys there was a great deal of loss in the way of breakage that the carrier was not responsible for; and yet we had been paying claims for anywhere from two to a dozen carboys in a single carload shipment of empty carboys being returned for loading. The most careful investigation failed to develop any reason for that breakage, so far as the carrier was concerned. Each shipment was followed with the greatest watchfulness, in order that a possible case of rough handling might be found before taking any positive position in refusing to pay further claims for such losses. After following up a number of such instances and finding that there was absolutely no case of rough handling from the time shipment was received from the shipper until it was delivered at destination, I arranged with the agent at the shipping point to go to the shipper's place of business and examine the carboys as they were put in the cars, and make a note of every broken carboy, if any, put in the car. I then arranged with the agent at destination to watch the checking out of this car and make similar record. Neither agent knew of the action of the other. The consequence of this was that instead of being asked to give a receipt for a given number of carboys as good carboys, it developed that of the ten shipments examined there were anywhere from two to a dozen carboys broken when loaded before being delivered to the carrier at all; and the check at destination developed that not a single additional broken carboy was added to the list. We had, as you will see, therefore, been handling carloads of carboys offered to us as intact and in good order, and so far as the chief in charge of traffic for that firm is concerned, he had no reason to doubt that the carboys were in good order when shipped, but the carrier was paying claims for breakage which occurred in the plant in the process of getting the full carboys emptied and the empty carboys loaded back in the car; and those shippers who are aware of the position taken by our company that we would not any further recognize any claims for broken carboys or for acid lost from broken carboys (except in the case of rough handling, such as wreck, etc.) will understand why we have decided that a glass carboy that in places is scarcely thicker than paper is in our opinion not a proper package for 260 lbs. of sulphuric acid.

Not only should the commodity intended for transportation be securely packed, but of the greatest importance is it that the loading of such shipments as are loaded at plants by shippers be carefully watched by competent men, in order that any damage due to the quick stops and sudden jars incident to modern freight transportation may be avoided. There is great room for improvement along this line on the part of shippers, and carriers are entitled to all the co-operation possible for shippers to give. Both the producer and carrier have difficulties hard to overcome, and it is particularly so in the case of the carrier owing to the fact that in contracting to transport freight between two points it is necessary for two or more roads to be used. If only one road were involved the difficulty would not be great, but the officers of one road have absolutely nothing to do with the management of the other and no control over it. Each particular group of officers, therefore, may represent a separate and distinct view or policy, and possibly not at all in harmony with each other.

Much has been done in the past few years to bring the different roads into uniformity, but much yet remains to be done before the carrier will be in position to handle with greatest facility all the cases presented for adjustment. When you consider how different are the methods of the different roads and the wide range of variation in their policies, you will agree that the achievement of the Freight Claim Agents' Association in the way of providing a common method for the handling of matters pertaining to freight claim adjustment is a great step in advance. This is supplemented on the larger systems by so-called family rules, under which one road makes immediate adjustment and pursues the work of investigation afterward. When you consider the methods which prevailed a few years ago, under which a claim was always investigated (and that with no undue haste), and authority for charge for each road obtained before the claim was paid, and compare it to the methods which prevail to-day, under which claims for known loss and damage are paid immediately and the investigation and authority for charge obtained afterward, you must agree that the carriers have already overcome many of their difficulties.

A most difficult thing to handle is the claim for concealed loss and such losses as are not noticeable upon delivery. There is opportunity for injustice here on the part of either party. The damage may be caused by the carrier or by the drayman before delivering to forwarding carrier or by drayman hauling from delivering carrier to consignee's house, or it may occur in either the house of shipper before forwarding or consignee after its receipt, but the damage not being apparent, carrier at destination delivers it to the drayman and a receipt is taken without exception. Upon opening package at consignee's house and the damage is discovered, the point then is to determine who damaged the shipment.

A shipper presents a box described as a case of wine. The carrier receipts for it. Upon delivery it is found to contain water. Consignee claims evidence of tampering and presents claim for loss on the ground that while in possession of carrier the package had been opened and contents replaced by water. That such cases could occur on part of trainmen or warehousemen or carrier is possible, but the opportunities for such work are so few that such instances would be rare.

Two or three years ago an Italian at Hillsville presented a claim for the contents of a box alleged to have contained his personal effects, but which was short at destination and not located by us. The amount was in the neighborhood of $100, and to his claim was attached an itemized list of the articles in the box and an affidavit in support thereof. Months after that one-hundred dollar claim had been paid we found the box at Coraopolis. Upon opening it we found one pair of badly worn, patched and soiled overalls, a pair of boots that would not shed water and a shirt which could have been bought new for 75c.

Shoes at $5.00 per pair which cost $3.00, dishes at $60.00 per set which can be duplicated at $25.00, clothing at $10.00 a suit and worth $4.00, coal at $2.50 a ton when sold at $1.75, coke at $4.50 per ton when it could be bought anywhere in the market for $2.50, are all of the same class—an effort to take advantage of the carrier's misfortune on the part of those from whom the carrier should expect and has the right to expect fairness and co-operation.

Another class or character of claim presents great difficulty in adjustment. A shipment is loaded by shipper at Pittsburg and forwarded to New York City. Upon arrival there the consignment is delivered to consignee, who receipts for it, and so far as delivering carrier is concerned the transaction is closed. Weeks after the shipper at Pittsburg presents to forwarding carrier claim for damages, claiming that the shipment had been wet en route. Now, in the first place, in placing cars for loading at the various plants it is not always practicable to give cars such inspection as would always determine whether roofs might not leak at obscure points, and the responsibility for loading such a car must rest with a shipper to a very large extent; but setting this point aside, the papers in the claim are forwarded to the claim offices of the roads interested and are returned by the delivering carriers, advising that not only was the shipment receipted for in good order, but up to that moment not one word of information or complaint had been given them that there was discovered any damage after car and package had been opened and no opportunity given delivering carriers to verify condition for his own record or take any steps toward an investigation.

Therefore there is nothing left to do but to decline the claim. The declined claim is sent back to forwarding carrier, who presents the situation to shipper. Shipper returns his claim and insists upon payment, stating that he has been compelled to make allowance to consignee in his settlements. Now, here you have a case where either shipper or carrier is loser the amount of an alleged damage. The most reliable of shipping firms have some very untrustworthy consignees. We don't deny the veracity of consignee, although we may have doubts about it in spite of that much misused and discredited document, the affidavit. Now, without considering any self-interest, but treating this case as all these joint difficulties should be treated, what should be the procedure? The claim has been presented to forwarding carrier, who is advised by his connections that no damage existed up to time of delivery. Consignee has said that he received it all right and in apparent good order, and at no later time had he corrected this statement by a notice of a later discovery. Claimant has made the allowance in settlement with the intention of making claim on carrier. He allows the loss, but intends to make some one else pay for it. Now, what equity is there in such a transaction? He hasn't any better information than carrier that any loss existed. He simply takes consignee's word for it. Is it good business? Hardly. There is, I think, a fair way to handle such a case, and that would be for shipper, upon receipt of such a representation on part of consignee, to state the situation to carrier and ask for his co-operation by promptly informing him if such a loss was on record at delivering point. I'll handle it by wire if referred to me. If it was not, then shipper should be satisfied that the transaction was an effort to defraud carrier or shipper and should in his own in-

terest refuse to allow such amount in settlement. There is no limit to which unscrupulous consignees could go in the handling of such cases if the shipper and carrier do not stand together in a demand for absolutely fair and square dealing.

Instances without number can be cited of claims just and unjust, avoidable and unavoidable. Instances of the indifference of the carrier on the one hand and the shipper on the other, each working to gain his point in the particular transaction without regard to the rights and equities of the other. Claims for overcharge due to errors in weights or rates, errors in figuring extensions, corrections for articles misdescribed at time of forwarding—many such claims are difficult of adjustment, but all adjustable nevertheless. But enough have been given to show that the closest co-operation between producer and carrier is as necessary to one as to the other.

What if it does cost a little more to properly pack a shipment—the cost of a loss by reason of improper package is greatly out of proportion to the cost of proper packing. What if it does cost a little more to properly mark a package, so that if astray it may quickly be forwarded and delivered to the proper parties? What if it does cost a little more to watch the loading and insure its security and safety during a journey under the modern conditions of transportation? The cost is slight in comparison with the losses which failure to do these things makes possible. Let us not be "penny wise and pound foolish." Let us not save one dollar at the loss of ten; let us rather face the facts that the profits of our business do not or ought not to come from any advantage in claim adjustment, and that every adjustment, whether of claim or a measure to avoid claims made on a reciprocal basis has done just that much to make the next adjustment easier to accomplish.

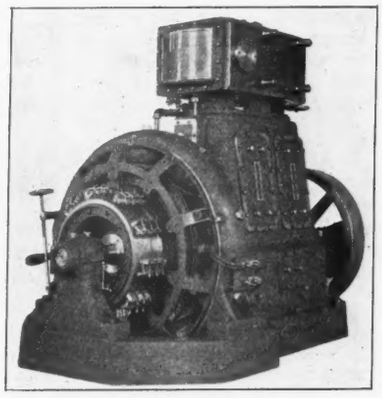
Some time ago a suggestion was made at a meeting of this club that great good toward the development of Pittsburg, particularly in its effect upon the relation between the public and the railroads, could be accomplished by the establishment of a commission, whose members should be selected from among the various railroad and industrial organizations. I have thought a good deal about that suggestion, and while not convinced that a commission so selected would or could accomplish what was expected of it, I am of the opinion that the shippers and carriers could be benefited if there could be a committee of say seven, three representatives of the traffic departments of each interest and one party identified with neither—I do not mean that such a committee should have any power as to final adjustments beyond those given in the specific case. There are many cases where both parties to a question are blinded by self-interest to such extent as to make an adjustment as between themselves almost impossible. A disinterested recommendation from such a committee might supply just the right idea or basis which both parties could accept.

The Austrian Locomotive Works have sent representatives to the Railroad Minister begging him to increase orders for locomotives to keep their works going, as they will soon be almost entirely destitute of orders. The Minister replied that orders had been given for all that were needed, and that there were no funds for any more. He also intimated that in a time of prosperity some years ago the locomotive works had increased their capacity beyond reason. He failed to observe, however, that a little later, when their orders were beginning to fall off, they had persuaded the ministry to give orders for more than a year in advance, the natural result of which was that the requirements for 1905 were largely supplied before 1905 came.

Sturtevant Generating Sets with Vertical Cross-Compound Engines.

The accompanying half-tone shows the latest design of generating set made by the B. F. Sturtevant Co., Hyde Park, Mass. The engines are enclosed with detachable hinged oil-tight doors on the sides and removable plates at the ends. A watershed partition, between case and bottom of cylinders, serves alike to prevent oil from the reciprocating parts being carried into cylinders and water from the latter being mixed with the oil. An oil pump directly driven from the main shaft supplies oil to all the bearings at an average pressure of 15 lbs., the course of the oil being to main bearings, along shaft, up crank webs to the pins and thence up connecting rod to the crossheads and guides. Speed regulation within 1½ per cent. from no load to full load is secured by the Rites inertia governor.

Both the high and low-pressure valves are double ported and balanced, the high-pressure being of the piston type, and the low-



The B. F. Sturetvant Co.'s Generating Set.

pressure a slide valve arranged to lift from its seat for escape of water.

The indicator gear is arranged so that cards may be taken without interfering with the oil tightness of case. The reducing motions from crossheads are always in place and automatically engage with short sliding rods which project through stuffing boxes in the side doors.

The generators of these sets are of the eight-pole type for sizes 17½, 25, 35 and 50-k.w., and 10-pole for the 100-k.w. The magnet frames are of best grade cast-iron, adjustable vertically and split horizontally to allow of removal of upper half for examination of armatures, etc. Shunt and series coils are separately wound and mounted on the pole pieces, which have cast-iron shoes and are through bolted to the frame to allow removal of individual coils. Both shunt and series coils are connected in series.

The armatures are of the iron-clad, two-circuit, form wound, ventilated drum type, with cores of special low carbon steel mounted on cast-iron spiders. These have hub extensions for support of commutators and are designed to avoid shrinkage strains and have ample bearing surface on shaft. The laminations are punched from best quality of thoroughly annealed electrical sheet steel, are set up under pressure, and are clamped together in such manner as to obviate all liability of displacement due to magnetic drag, etc. Space blocks are inserted at intervals between laminations to provide ventilation. The armatures are balanced both electrically and mechanically.

The commutators are made up of bars or segments of pure hard drawn copper, secured on cast-iron shells of spider construction and clamped with steel rings. Insulation between the segments consists of the best quality selected mica, and the end insulation of micanite rings.

Another unique feature of these sets is the brush rigging which is noticeable on account of its compactness. The brush holders are of the sliding socket shunt type with flexible connection to each brush, and are mounted on studs projecting from brusn rigging, and so arranged as to be readily rotated for adjusting brushes. The holders are staggered so that brushes shall wear evenly on commutator and each brush is separately removable and adjustable. Sufficient brush surface is allowed so that current density will not exceed 30 amperes per square inch bearing surface.

All insulation receives a 60 second breakdown test of 1,500 volts alternating, and shows a resistance of at least one megohm with an initial voltage of 500. The insulation is damp proof and unaffected by temperature up to 100 deg. C. It is claimed that the generators are capable of carrying 50 per cent. overload for short periods of time, without shifting of brushes or sparking at commutator, and will run continuously at 25 per cent. overload without sparking or undue heating; after a continuous run of 10 hours, the heat rise, in any of the parts, will not exceed 40 deg. C. above surrounding atmosphere. Full load may be thrown on or off without affecting the voltage more than 15 per cent.

All parts of both engines and generators are made from templates and duplicates are carried in stock.

General Electric Company Report.

The profits of this company for the year ended Jan. 31, 1905, were $6,719,546. This includes $281,927 realized from securities, and $465,717 from royalties, dividends and sundry profits; and there has been deducted after all reasonable allowances for depreciation and losses, including $593,624 written off from patent account and $1,778,492 from factory plants and machinery. Further, from this $6,719,546 the sum of $759,654 was subtracted as a debit to profit and loss caused by a revaluation of the assets of the Stanley Electric Manufacturing Company and other acquired interests. From the $5,959,892 remaining, $3,684,384 was paid in dividends during the year, leaving a surplus for the year of $2,275,508. This, added to the $7,293,689 surplus at the end of the last fiscal year gives a total surplus on Jan. 31, 1905, of $9,569,196. The sales billed to customers during the year amounted to $39,231,328, which is about $2,500,000, or 6 per cent., less than for the previous year. The total orders received were $35,094,807. These figures compare with sales amounting to $22,379,463 billed during 1900. Among the contracts mentioned in the report is one with the New York Central & Hudson River for thirty 90-ton electric locomotives, and eight 50,000-k.w. capacity steam turbines; and for the entire switchboard plants for the Mount Morris and Yonkers power stations. Daily tests for several months under all conditions of the first electric locomotive built for the New York Central show that the engine attained a speed of 52 miles an hour with a 550-ton train and a speed of 69½ miles an hour with a 250-ton train on a four mile run. Unofficial tests on the track after it was extended to six

miles show a speed of 75 miles an hour. An installation which will eventually develop 60,000 k.w. has recently been made for the Mexican Light & Power Company, for which purpose 31 transformers of 60,000 k.w. total capacity have been furnished. The new alternating current railroad motor has been successfully employed on two tramways and several additional orders have been received. During the year, there was expended in acquiring patents and in patent litigation $523,624, which has been taken out of earnings, leaving the company's franchises and good-will at $2,000,000, as on Jan. 1, 1904.

Orange River Colony are to be consolidated into a single system to be known as the Central South African Railroads, under control of the Governor as High Commissioner.

Westinghouse Compound Pump.

BY F. H. PARKE.

The new design of Westinghouse compound pump consists of three cylinders placed vertically in tandem. The two lower ones joined by a thin center piece constitute the air end of the pump, and these are surmounted by a center piece and steam cylinder of the regular Westinghouse type, so that in general appearance this new pump, although somewhat longer, is very similar to the regular Westinghouse pump. The design is very compact and, since the air end only is compound, the additional features required are so similar to the old standard that the same simplicity of operation is assured.

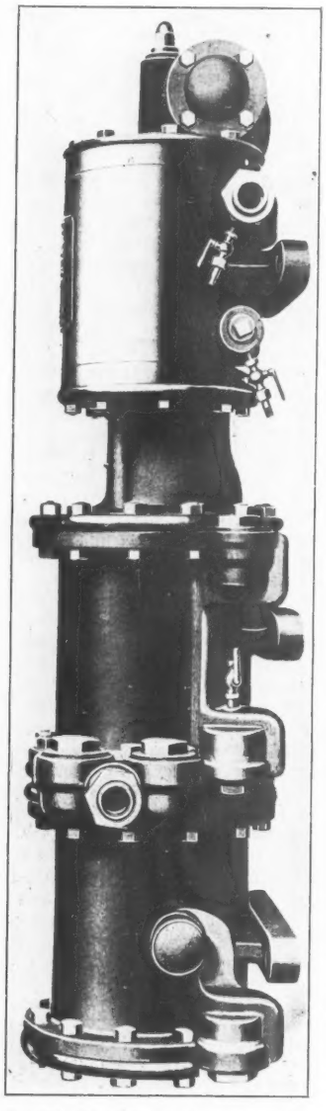


Fig. 1—Westinghouse Compound Pump.

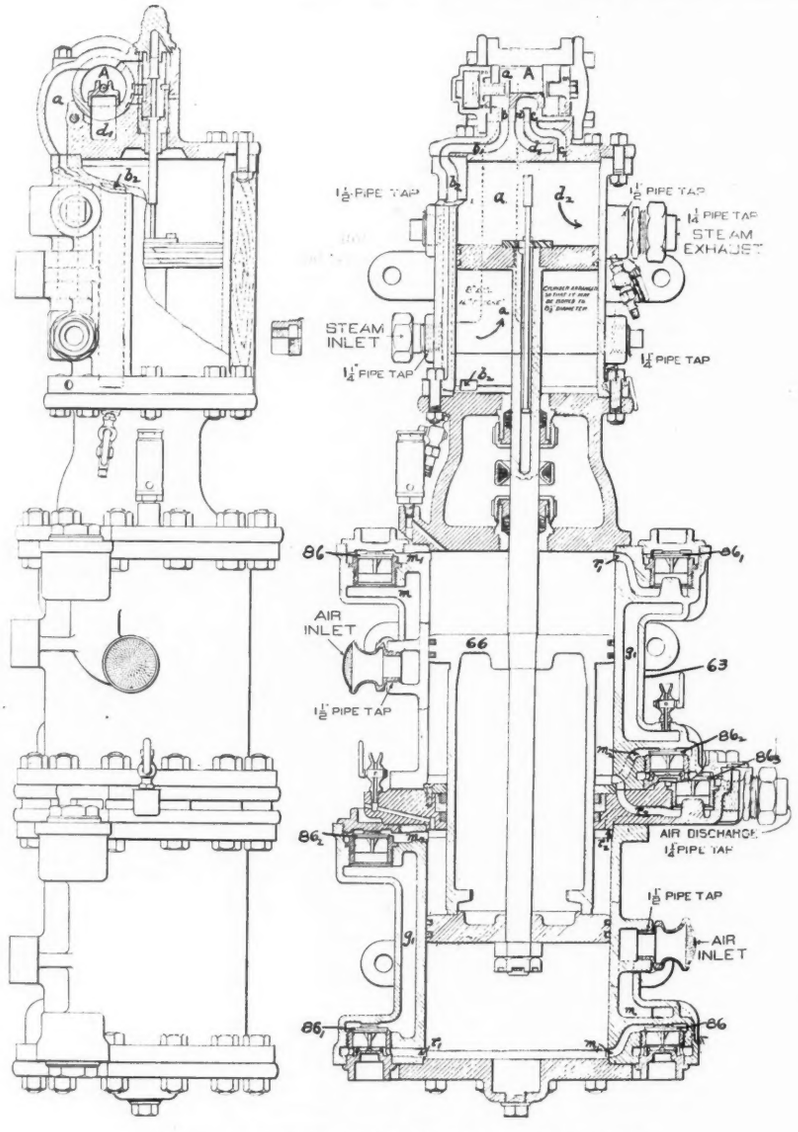


Fig. 2—Sections through Air and Steam Cylinders.

At the end of the fiscal year of 1893, the book value of the Schenectady, Lynn, and Harrison factory plants was $3,958,528. During the twelve years from that date, additions over and above ordinary expenses for maintenance and repair have been made at a total cost of $17,074,010, leaving the total book cost of the plants $21,032,539. During those twelve years, there have been written off the books allowances for depreciation amounting to $13,532,539, leaving the book value of the three plants on Jan. 31, 1905, $7,500,000, divided as follows: Schenectady plant, $5,176,724; Lynn plant, $2,038,275; Harrison plant (lamp factory), $285,000.

The railroads which have been controlled by the Governor of the Transvaal and of the

Generally speaking the compounding of the air end is done as follows: The two air cylinders are of the same diameter, each having a piston suitably connected to the piston rod which is actuated by the steam piston. These two air pistons are further connected by a drum of smaller diameter than the inside diameter of the air cylinders in such a manner that the two pistons and drum form a sort of spool. The center piece between the air cylinders fits closely about the spool and has packing rings to prevent the passage of air from one cylinder to the other past the surface of the drum. The low-pressure air is drawn into the top of the upper cylinder and the bottom of the lower cylinder and during compression is forced through suitable valves and passages to the annular volume formed between the spool, air cylinder walls and center piece. The final compression takes place in this annular volume and the air is forced out through the passages and valves in the center piece to the discharge opening. It will thus be observed that in each air cylinder both high and low-pressures are single acting, but that these pressures on the air piston as a whole are double acting. The resultant effect, therefore, on the steam piston rod is almost the same as in the simple pump, but the air cylinder surface being twice as great as in the simple pump affords twice the opportunity for radiation of heat, and for that reason the temperature of the air discharge is considerably reduced for locomotive service.

Also by thus compounding the air end a much smaller steam cylinder can be used to operate the pump, thus causing a marked economy in steam consumption.

The present design of pump consists of

a steam cylinder 8 in. in diameter by 12-in. stroke, and two air cylinders 11 in. in diameter by 12-in. stroke, while the small diameter of the spool is 8¾ in. It is made for a capacity similar to that of the standard 11-in. pump, which has been on the market for some years, having air and steam cylinders each 11 in. in diameter by 12-in. stroke. Consequently the compound pump has an 8-in. diameter cylinder instead of an 11-in. as with the standard, and the steam consumption is thereby reduced to about 52 per cent. of the latter through this change alone. But by compounding the air end the capacity of the pump is increased about 16 per cent. when pumping against 90 lbs. air pressure, due to the fact that the low pressure clearance volumes at the end of a compression stroke are filled with air at only about 40 lbs. pressure instead of 90 lbs. as in the simple pump, and in the former case this pressure reduces to the atmospheric pressure much earlier during the intake stroke than is possible with the standard pump, consequently the volume of air drawn in at each stroke is that much greater. For this reason the saving per cubic foot of air compressed is greater than that shown by the difference in steam cylinder volume, and from tests made on the compound pump it appears that it requires only about 45 per cent. of the steam per cubic foot of free air compressed that is required for the standard 11 in. pump.

This, of course, is an immense saving of itself. But since the amount of air compressed per stroke is greater, the time required for the pump to operate is thereby diminished and the amount of wear and cost of maintenance are correspondingly decreased.

The air valves, valve seats and valve cages are of the same pattern as those used in the 11-in. pump, while the steam valve mechanism corresponds exactly with that of the 9½-in. pump. Also the piston rings of the two air pistons are similar to the 11-in. pump and the steam piston rings correspond to the old standard 8-in. pump, many of which are still operating on railroads. The steam and air connections are also made up of standard pieces that are now in use on the other pumps so that by the introduction of this new compound pump the amount of repair stock required outside of that already needed by railroad shops is very small.

Since the working parts are all modeled after those of the existing standards, the knowledge possessed by repairmen at the present time will serve them in making repairs on the new pump without any extended extra instruction. The rules already issued for operating air pumps will in nearly all cases apply to the new pump, so that its introduction, in almost every way, will cause no trouble or inconvenience to the operating departments.

The greatly increased weight of cars demanding larger brake cylinders, together with the greatly increased length of trains, has brought about the expenditure of a much greater quantity of air and naturally the requirement of a larger air pump. It was this fact that brought out the 11-in. pump. With the introduction and general adoption of the high-speed brake and high-pressure control apparatus, the main reservoir pressure was increased from 90 to 120 lbs. Consequently the work of the pump was greatly increased, and the consumption of steam by the air pump has been found to be a considerable factor of importance; and the introduction of an air pump designed to give the greatly increased amount of air, and at the same time require a much less amount of steam, has been made a necessity which both the railroads and the Westinghouse Air-Brake Company have for some time past recognized.

The illustrations will give a clear idea of the design and operation of the pump. The front view of the pump shows the general arrangement. It will be noticed that the steam cylinder is made both right and left hand so that the steam and exhaust connections can be made on either side, or both on one side. The lower thin center piece connecting the two air cylinders contains the final discharge valves and orifice. Each air cylinder has a suction strainer through which the air is drawn into its low-pressure volume.

Fig. 1 is a side view of the pump, showing the position of the air valves and ports as well as the lugs for supporting the pump in position.

Fig. 2 shows a front central section of the pump and a side view partly in outline and partly in section. From this drawing the operation of the pump can easily be followed through. Steam enters from the governor at the steam inlet and passes through the valve, from thence it goes to either the top port a, a, to the cavity A over the main or the bottom of the steam cylinder in exactly the same manner as in the present 9½-in. or 11-in. pumps.

The operation of the air end, however, is quite difficult. On the down stroke air is drawn in through the upper air inlet on the left hand side of the air cylinder; it passes through the passage m, receiving valve 86, m_1, to the low-pressure volume above piston 66. When the piston reaches the lower limit of its stroke and starts upward, this air is compressed until the upper discharge valve 86_1 (on the upper right-hand side of the cylinder) is raised, then the air is forced through port r_1, discharge valve 86_1, passage g_1, receiving valve 86_2 and port m_2 to the annular cavity between the drum portion of piston 66 and the cylinder 63. Since this volume is much smaller than the low-pressure volume, the air is being compressed during its passage from the low-pressure to the high-pressure volume until, when the piston reaches the upper limit of its stroke, the air in the low-pressure clearance passages and high-pressure volume has reached the intermediate pressure of approximately 40 lbs.

During the following down stroke this high-pressure air is compressed until it raises the final discharge valve 86_3, when it passes through port r_2 and the discharge valve to the discharge orifice in the center piece between the air cylinders.

This same operation occurs in the lower cylinder when the piston moves in the opposite direction from that described above, and as corresponding passages are designated by the same letter the operation can be readily followed through from the description just given.

The air cylinder is lubricated by three oil cups, as shown on Fig 2. The upper end receives its oil from the automatic oil cup placed just to the left on the upper center piece. The piston drum receives its lubrication by the oil from the cup connecting with passage g_1 in the upper air cylinder, and is drawn into the high-pressure volume by the air as it goes from the low-pressure to the high. The lower end of the air piston is lubricated by the oil cup situated on the left side of the lower center piece. The last two oil cups mentioned are old style air cylinder oil cups, whereas the other, and that in the front view of the pump, are the new automatic-air cylinder oil cups. This cup can readily be used for the upper low-pressure cylinder whenever desired. It is thus seen that the complication due to compounding by this design is materially reduced, and all parts are made strong and durable and as nearly like standard simple pumps as it is possible to make them.

The Mentor Disaster.

The derailment on the Lake Shore & Michigan Southern Railway, at Mentor, Ohio, June 21, which was briefly reported in the *Railroad Gazette* of June 23, page 715, resulted in the death of 19 persons (15 passengers) and the injury of 15 or more. The four trainmen killed were the engineman, the baggageman, the barber and a porter. The fireman was injured, but not fatally. The facing-point switch, which was misplaced and which turned the train on to a freight house track, was about 400 ft. west of the station. How it became misplaced has not yet been explained. Passenger train No. 10, preceding No. 26 (the one which was wrecked), had passed over the line about an hour before and it is said that no other train had been at or near the switch in the intervening time. The station agent and one or two other men were on the platform shortly after the passage of No. 10 and again two or three minutes before the arrival of No. 26, and it is said that they report all the switches as right. The theory that the switch was maliciously misplaced has been investigated, but thus far with no satisfactory result. One statement is to the effect that the misplacement must have been done within the two or three minutes after the agent was on the platform and before the train reached it. One statement is to the effect that the switch showed all right and another that the light was found extinguished. Immediately after the derailment the switch was found locked for the side track. There is a report that the agent of the Nickel Plate road, going toward the Lake Shore station that night, met a boy with a lantern who said that he had been to set a switch. Another story is to the effect that tramps have been camping around the station and that detectives are hunting for them; and a third has to do with the ejection of a man from a freight train a few weeks since and his alleged threats of revenge.

The train was running at such high speed that the engine, on striking the freight house platform, or some other obstacle, was turned completely around. Its fire ignited the freight house and that building was burnt down; and two of the cars of the train were burnt with it. The foremost car, a combined smoking car and dining car, the tender and the engine, were piled into a heap together.

Mr. Charles Watts, a veteran officer of the Pennsylvania Lines, was on the train, and his experiences are reported as follows:

"There were a number of passengers about me chatting, when, without a moment's warning, I found myself pitched headlong over three seats forward. The coach went bouncing along over the tracks and ties, but kept right side up. The passengers were hurled in every direction, and some of them began screaming for help. The lights went out instantly, leaving us in total darkness. The crashing of wood and timbers as the front cars piled one on top of the other and the tender of the engine went flying over the engine, together with the whistle of the escaping steam, made a scene of confusion that made my blood run cold. . . . Fire broke out in the splintered coaches five minutes after the crash. When I reached the front car not a person seemed to be stirring in the debris, nor alive. The story about the cries, screams and shrieks of the passengers buried under the woodwork is overdrawn. They were either already dead, or stunned, and never regained consciousness. One of the bravest men I ever saw was the engineer. He walked around after being

brought out from the ruins, and I said to him: 'You're all right.' 'No,' says he, 'I am not all right; I shall die. I have inhaled steam; I can feel it in here,' pointing to his chest. 'I know what that means; I shall die.'

"A more heroic lot of passengers I never saw. People who before the crash were chatting gayly, after the five minutes of suspense, that seemed an hour, had passed, made a rush for the scene of trouble, each vying with the other to help the injured and remove the dead. I have been through four wrecks, crawling out through a window each time, but this was the most horrible and heart-rending of all. . . ."

On Friday it was announced that although the speed of the train, being not higher at this point than that of many other trains, could not be considered the cause of the disaster, the schedules between New York and Chicago would nevertheless be lengthened from 18 hours to 20 hours; but on Monday this action was rescinded and the 18-hour schedule was resumed.

Railroad Commissioner Morris, of the State of Ohio, is quoted as saying that there is no question in his mind but what the switch was open at the time the train approached, and expressed the opinion, from rumors and reports picked up during his investigation, that the engineer discovered the open switch some distance back and endeavored to check the speed of his train by putting on the emergency brakes and applying sand. The train kept the rails on the side track for a distance of about 70 feet after taking the frog, then it left the track and a little distance farther on crashed into the freight house, falling into the excavation beneath that structure.

"No train had passed that point in either direction between No. 10, which passed at 8.10 p.m. and No. 26, the wrecked train, which was due at 9.22 and arrived on time. The switch is one of the kind which stands on a concrete base, and works by a horizontal lever. It was locked at the time of the wreck. It had been opened and thrown by someone having a key."

The Lake Shore road has a rule that in approaching switches and semaphores, firemen must observe that all lights are properly indicated on their side of the engine, and so inform the engineer, while the latter must observe on his side and pass the "O. K." to the firemen. In this instance, Commissioner Morris was informed, the fireman passed his "O. K." on the switch in question, and the engineer did the same.

This, says the Commissioner, leads to the theory that the switch was thrown at the time the train was several hundred feet distant, and that the wrong light was discovered by the fireman and engineer before hitting the switch, from the fact that passengers say they felt a grinding of the wheels at a point about 200 feet from the switch, like the air brakes being suddenly applied.

Commissioner Morris said he did not see any indications of sand having been dropped, but that did not discredit the belief, as many trains had passed since the wreck, and the wind could have cleaned the rails and ties.

Since the foregoing report was compiled, and since our editorial note was written, a despatch from Cleveland, printed in the New York *Sun*, reports Coroner Siegelstein, of Cuyahoga County, as saying that: "Barring the infinitesimal chance that new testimony is coming, I can see no possibility of any other verdict than that to the effect that the Twentieth Century Limited was wrecked by running at the rate of sixty miles an hour into an open switch at Mentor; that the engineer had no opportunity to stop his train after he first saw the red light because his view was shut off by a water tower, and that the evidence tends to show that the responsibility rests with an employee of the company.

"It seems to me the height of foolishness to contend that either a miscreant, a maniac or a revengeful former employee of the railroad company deliberately wrecked the train.

"For several hundred feet the tower shut out the view around the curve, but just as the train came on to the straight track again and the engineer could again see the lights before him, he shouted to the fireman to jump for his life. That fearful warning is conclusive proof to me that the red light showed the engineer that he was dashing upon an open switch. The sand which strews the track is further evidence. The company's claim that the switch was open with the light turned white is utter folly. It is not only a mechanical impossibility, but it is disproved by all the evidence adduced.

"I find it equally impossible to believe that either a maniac or a former employee, enraged against the company, could have wrecked the train. If a maniac, how would he have obtained the switch key? And is it reasonable to suppose that he could have unlocked, turned, then locked again the switch in his paroxysm of fury, even if he had known how to throw it? And it is equally unreasonable to presume that a man who had been employed by the road would select for his purpose a switch almost opposite a station, and in full view of several houses at 9 o'clock at night."

The Prussian State Railroads have been making extensive experiments on the sizes most suitable for broken stone ballast. The conclusion is that the prices should not be smaller than 1 in. and not larger than 2½ in. cubes. If larger they cannot be tamped without breaking.

Railroad Shop Tools.

(Continued.)

LATHES.

Fig. 1 shows a 22-inch engine lathe made by Greaves, Klusman & Company, Cincinnati, Ohio. This machine, made from entirely new patterns, is equipped with the most modern improvements and is equally well adapted to the handling of either heavy or light work. The head stock is massive and is strongly webbed. The spindle is of crucible steel and has a 1 13/16-in. hole through its entire length. The spindle bearings are of composition metal and the thrust collars are of hardened steel. The cone is provided with 5 steps for a 3-in. belt and is strongly back-geared. The tail stock is cut away so that the compound rest may be set to an angle of 90 degrees, thus permitting the tool to operate on the smallest diameters. All feeds are reversed in the apron, the mechanism of which is arranged so that it is impossible to throw both the rod and screw feeds in at the same time. The carriage runs in Vs and has a bearing its entire length. An eccentric clamp locks it in position when cross-feed work is being done, and it is also provided with an automatic stop which is especially useful when a large quantity of duplicate work is to be turned out. The friction cross-feed is graduated to one-thousandth of an inch, and it is made so that if the cross-feed is allowed to run beyond its limit, no harm will be done. There are four changes of belt feed besides a number of changes of feed obtainable by gears. Threads from 2 to 24 per inch, including 11½ pipe thread, can be cut without changing the gear on the spindle and right or left threads can be cut without changing any gears. All that it is necessary to do

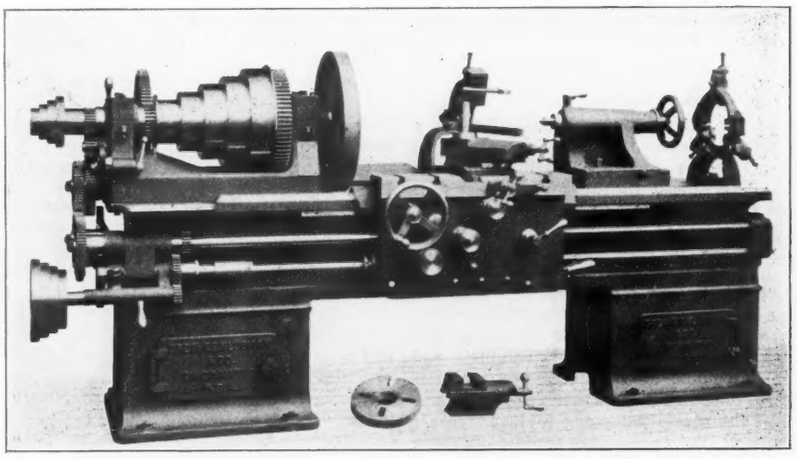


Fig. 1—Greaves, Klusman & Co.'s 22-in. Engine Lathe.

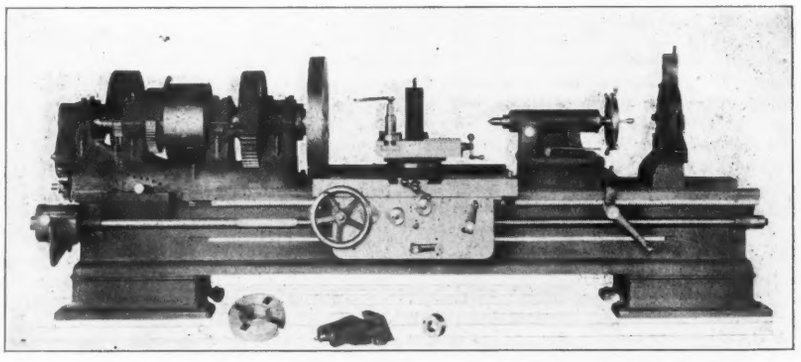


Fig. 2—Lodge & Shipley 30-in. Lathe with Patent Head.

when changing from right to left cutting is to reverse the lever shown at the end of the head stock. By means of a drop-plate in the apron the rack-pinion can be disengaged or dropped when chasing threads. This releases all the gears not in use and thus reduces the friction on the carriage. The countershaft is provided with 14-in. friction pulleys for a 4½-in. belt. These pulleys should run at 130 and 160 r.p.m. It is unnecessary to reverse the lathe when thread cutting, as an index dial connected with the lead-screw is fitted to the carriage.

The 30-in. lathe shown in Fig. 2, presents the most advanced stage in lathe design reached by the Lodge & Shipley Machine Tool Co., Cincinnati, Ohio. It will be noted that a radical departure from the old standard has been made, particularly in the headstock, which shows a single wide-faced pulley of large diameter in place of the cone, and the addition of a pair of bearings at the center of the headstock between the main spindle bearings. The details of this head are fully illustrated in Figs. 3 and 4. The power is applied through a wide-face pulley, keyed to a sleeve revolving in the two central bearings. This sleeve is provided at one end with a jaw clutch, and at the other with two gears of different diameter. The lathe spindle passes through this sleeve and revolves in the two end bearings. As the diameter of the bore of the driving sleeve is about one-eighth larger than the diameter of the spindle. It will be seen that none of the pull of the belt on the driving pulley is communicated to the spindle itself. The headstock is provided with two sets of back gears in the ratios of 3.9:1 and 14.4:1. For obtaining direct belt speeds to the spindle, the clutch is engaged by the lever at the front of headstock.

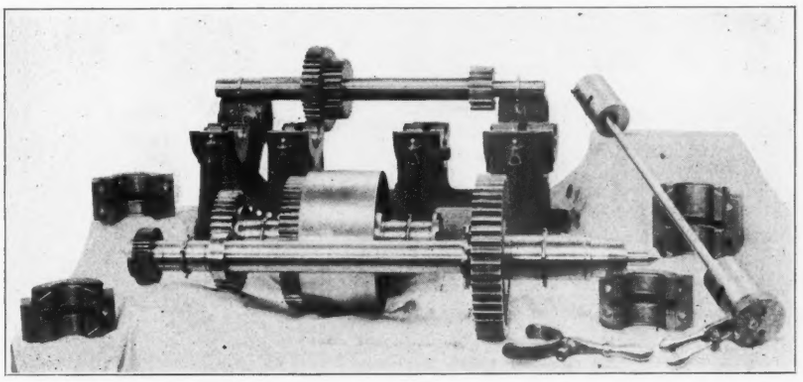


Fig. 3—Details of Lodge & Shipley's New Lathe Hood.

The oiling facilities are particularly noteworthy. Attached to the spindle and sleeve at the center of each bearing is a brass ring, provided with projecting buckets. The bearings are cast with a reservoir in which the buckets on this ring dip, so that at each revolution of the spindle a quantity of oil is dipped up and poured on the bearings. The system has the advantage of providing positive lubrication regardless of the temperature of the oil and its thickness. At the front of the headstock are cast lugs into which are fitted glass tubes. The height of the oil in the reservoir can thus readily be ascertained by the operator of the machine. In practice it is found that the bearings fitted with this type of oiling device run about 30 days without replenishing the oil in the reservoir. The back gear shaft is made so as to place the bearings at the ends of the shaft, instead of at the interior of the sleeve. These bearings are also provided with the same style of ring oiler as the main spindle bearings.

This lathe is particularly adapted to railroad shops, inasmuch as it is not in any way special, but combines with the advantages of the quick change gear system, the additional advantage of being very powerful and able to obtain from the tool steels now being offered, their maximum efficiency.

(To be continued.)

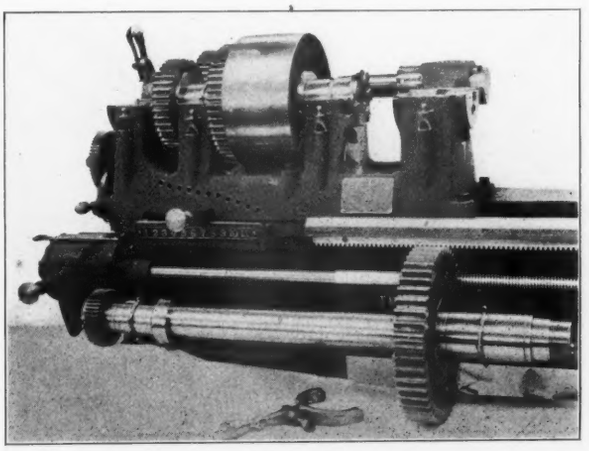


Fig. 4—Details of Head with Spindle Removed Showing Sleeve and Cone-pulley.

Piked Up on the Road.

BY GULF.

A number of years ago there was a fatal rear-end collision on a prominent line, due to the opening of the conductor's valve by a drunken member of the state legislature. Since that time it has been the custom, on most roads, to post a notice over the valve to the effect that it is only to be opened in case of danger or accident, and that whosoever meddles with it at any other time is guilty of a misdemeanor. This notice apparently has the desired effect as tampering with the valve is almost unheard-of. I noticed recently, however, on a heavy passenger line, that the handle of the valve is exposed on the interior of the closet and is merely labeled "Conductor's Valve," with the words "Open" and "Shut" at the extreme positions of its throw. The question arises whether, if some mischievous or ignorant passenger should open the valve the railroad company could not be held responsible for negligence in that it failed to post the usual warning of "Hands off."

The old-fashioned wooden window blinds are becoming things of the past, and in their place we have cloth shades of various kinds. Some are good, some neither good nor bad, and some are positively bad. From the standpoint of the passenger, the requirements are that the shade shall serve as a shield against the direct rays of the sun, and that it shall be easily adjusted to any desired position. From the standpoint of the railroad company, they should be durable and of such a character that the passengers will not grumble. Personally, I am not in love with the heavy damask curtains that shut out all the light, and which by their very weight and thickness, carry suggestions of microbes and disease, to say nothing of the dust and cinders that find refuge within their meshes. I prefer the light, yellow linen curtains that some roads use, which can be kept clean, and are not filled with dirt and bad odors at the end of the first trip. They do not exclude all of the light, and yet they afford sufficient protection against the sun, and they can be washed. They are inexpensive, and if the companies using them would put a little of the money that they save into fixtures that would fix and rollers that would roll, and not persist in a refusal to lift and stick, the light shade would be a boon and less of an irritation than it is frequently found to be.

A contemporary recently published an editorial on the use of simpler mathematics, and the comparative uselessness of differential calculus and quadratics in the affairs of every-day engineering. The points were well taken and sustained, and are worthy of emphasis and reiteration. The engineer must needs provide for so many uncalculable variables that an approximation is frequently impossible, and an ample factor of safety must be allowed to meet unknown contingencies. Apropos of this, during a conversation between two fairly well-known engineers, in discussing some methods of calculation one laughingly remarked: "Oh, you're not the man I'm looking for. I want an engineer who uses differential calculus in his daily work."

"Heavens! I never get beyond long division."

"Long division! Addition and subtraction measure the depth of my mathematical plunge."

This may have been a slight exaggeration, but it shows the tendency of the most efficient workers to avoid higher mathematics for working purposes.

Speaking of this tendency towards simplicity, it is well to urge upon teachers and young men the desirability of cultivating the power of analysis as an aid in the solution of problems. With a thorough appreciation of the universal application of the law of the conservation and correlation of forces, things become much simpler. It covers the graphic delineation of all bridge and roof stresses, the action of the lever, wheel and axle, wedge and toggle joint; the work of belts, gearing and lifts of all kinds. Then, in the measuring of surfaces, the rules applying to rectangles and triangles apply to about everything else. And so it runs through the whole gamut of engineering problems. There are a few principles that cover a wide range of practice. In regard to these it is well for the young engineer to re-

member Captain Cuttle's advice: "And when found, make a note of."

George Eliot remarked in Romola that there are some men to whom if you remark with an air of reserved dignity, "I am a buffalo," they will admit you anywhere. Perhaps, however, it comes about because a name was wanted for a nameless thing, or maybe it is but another exemplification of the saying that if you but cry long enough and loud enough the mass of men will believe you. A few years ago a truck was offered to the electric railroads similar in the general arrangement of its parts, to the ordinary four-wheeled truck used under the passenger cars of steam railroads. The manufacturer supposing that that type was a standard of the M. C. B. Association, called it a Master Car Builders' truck. Evidently the name took, for now throughout the whole electric railway world it is used to describe and define just that peculiar truck which we have known for so many years as a four-wheeled truck. The term has even appeared in text-books written by men who must know that the Master Car Builders have no standard truck, so that it seems as though the name so ignorantly given has fastened itself and is destined to abide. On the whole, this is a good thing, for, with the multiplicity of designs that are now offered, it is well to have some sort of a name by which to designate old acquaintances.

The economical and rapid welding of tubes seems to be a subject of perennial interest, so that it may be of value, as a hint, to retail how it is done at the Brightwood shops of the Big Four at Indianapolis. In the first place, tubes are cut off with a circular cutter, as usual. The heating is done in a coke fire, after which they are scarfed and the safe end put on. Then they are brought to a welding heat in an oil furnace, the welding being done under rollers, and then swaged under a pneumatic hammer fixed over an anvil. The process is very rapid, and this single small plant is capable of doing all of the work that is needed on the road.

Speaking of tubes, there is in the old Boston & Albany shops at Rensselaer, N. Y., a very effective flue cleaner which has been in use so long that a recent visitor said it was either something entirely new, or was so old that the present generation knew nothing about it. It consists of a long bed made of two 11 in. x 4 in. timbers, carrying rails for the traveling carriage upon their upper edges. At one end there is a headstock with a tight and loose pulley making about 150 revolutions per minute. The spindle of this headstock carries a square center that is jammed into the end of the tube to be cleaned and thus serves as a driver. The carriage carrying the cleaning rolls is fed by means of a chain passing over a wheel beneath the headstock, driven by a belt and gear taking power from the rear of the spindle.

The cleaning is done by means of three rollers having diamond shaped teeth, between which the tube is run. The two lower rollers are on fixed spindles set in the body of the carriage, upon which they are free to run. The third roller is mounted on a similar spindle that is carried in a swinging arm, and can be lifted up out of the way for the placing and removal of the tubes.

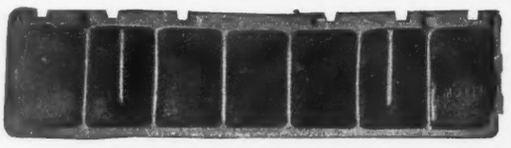
In operation, the tube is jammed up against the square driver, and then laid upon the two lower rollers. The upper roller is then pressed down upon it by the operator with a lever having a purchase of four to one, and the feed started. The whole of the cleaning gear is held like a tool in the ordinary tool post of a lathe. A man working leisurely can clean 14 ft. tubes at the rate of about one per minute. The apparatus is home made, and has been duplicated for use in the other shops of the road.

It is an interesting, though rather fruitless, speculation to consider the losses incurred by railroad companies in the course of a year as the result of carelessness and thoughtlessness. Not the carelessness and thoughtlessness of ignorance and stupidity, but of those who ought to know better, if they would stop to think. For example, in designing, the man in the office frequently fails utterly to realize that there are such things as roundhouses and running repairs. Engines are designed to be put together, not repaired. It was only the other day that I saw an engine with spring hangers so arranged that they could not be taken out or a broken spring replaced without removing the pedestal binders and jacking up clear of the driving wheels. As to carelessness, in the same shop I saw an engine blowing off steam against the surface of a newly painted tender, to the ruination of the varnish. I do not know what the cost of maintenance of that road might be, but I can make a guess that there was a chance for an advisory engineer to earn a liberal salary.

A New Car Replacer.

The accompanying illustrations show a new car replacer made by the Buda Foundry & Manufacturing Company, Chicago. One of the important features to which special attention is called is the groove that protects the flange by allowing the tread of the wheel to first engage the replacer preparatory to mounting. This construction, which makes it possible for the tread, and not the flange of the wheel to first grip the replacer, is shown in the cut.

The Buda Car Replacer.



Bottom View of the Buda Car Replacer.

The increase in the friction thus secured, over what would be possible if the flange only were presented, is readily apparent, and the great force and shock to the equipment that is ordinarily made necessary is obviated and thus is avoided the injury which so often occurs to the flange, equipment or to the replacer while rerailing a car. Again there is overcome the tendency to shove the replacers out of position, and also the spinning of wheels in the attempt to secure, on the flange alone, sufficient friction to start the ascent, especially in the case of very heavy equipment, such as locomotives.

The ends of the replacer are made with a gradual slope as shown, thus giving a gradual and easy ascent of the wheels to the rail.

The inner replacer shows plainly how the wheel is forced toward the rail. Repeated experiments have shown that it is not possible for the wheel to travel over the top of the replacer and drop on the opposite side —the deflection has been proved positive and absolutely complete in each instance. During the entire rerailing operation there is no shock whatever. Tests made by the Hunt bureau of tests demonstrated that the Buda replacer will sustain a load more than two and one-half times as heavy as any locomotive now in use. This is accomplished by the proper distribution of metal and not by any undue amount. A cut is shown of the under side of a replacer which illustrates its construction. Convenient carrying handles are provided which are shown near the end. Another style has center handles. The replacers come in two sizes, the No. 1, for 60-lb. rail, weighing 150 lbs. a pair, and the No. 2, for 100-lb. rail, weighing 200 lbs. a pair.

There has been a widely published announcement that a Belgian company is prepared to build a canal in Russia from the Black Sea to the Baltic. Such a canal would be just a thousand miles long and it is said that it will be 30 ft. deep, with a bottom width of 114 ft., and will cost $100,000,000. Such an enterprise seems an unpromising one, granted that it could be executed for the sum named. From all that part of Russia the cost of transportation, once a railroad station is reached, is comparatively small, for freights for long distances are very low in Russia. What troubles the Russians is the great distances from the farms to the stations (for the railroads are frequently more than 40 miles apart), and the inability of the latter as now equipped and worked, to carry away the produce as fast as it is delivered in the fall and winter. An increase in the number of the railroads and the improvement of the existing lines will be worth more to Russia than any thousand miles of canal.

GENERAL NEWS SECTION

NOTES.

The Wabash road has discontinued the employment of separate men to take tickets on passenger trains, and all of the collectors, said to be 110 in number, have been taken out of service.

Officials of the State of Pennsylvania are calling on the railroads of the state to report all shipments of horses and cattle brought into the state; this in order to have a more thorough sanitary inspection.

"The Southern Freight Rate and Claim Bureau" has been established at New Orleans by J. J. Buras, who offers to act for shippers and consignees in adjusting freight claims which they may have against the railroads.

The railroad commissioners of Kansas have declined to entertain a complaint against the Pullman Company concerning its rates, holding that the board has no authority over the company, as it is not a common carrier.

The Indiana Union (Electric) Traction Company announces that agents are to be appointed at 40 or 50 cities and towns on its lines. These agents will sell tickets and the sale of round-trip tickets by conductors on the cars will be discontinued.

On the Philadelphia division of the Pennsylvania Railroad an order has been issued requiring that empty engines, switching engines and work trains when waiting on side tracks must keep themselves in communication by telephone with a block station.

The legislature of Connecticut has referred to the next legislature the proposition to abolish or amend the law requiring the railroads to allow four days' free time for the unloading of freight cars. The avowed purpose is to wait and see if the New Haven road carries out its promise to improve its freight train service.

The Hocking Valley road is to establish the telegraph block system between Carey and Walbridge, Ohio, 45 miles, and it is expected to put the signals in operation August 1. Fourteen additional operators will be employed. Between Carey and Walbridge the Cincinnati-Detroit trains of the Big Four run over the Hocking Valley track.

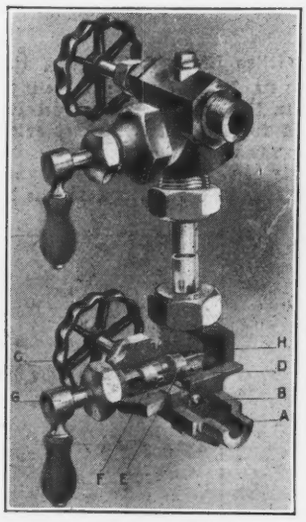
The state railroad commissioners of South Carolina have issued an order calling the attention of the railroads of the state to the law forbidding the running of freight trains on Sunday, which it is said has been violated. The reporter who announces this fact sems to be in doubt as to whether the order will amount to much. According to his view the railroads have never adhered to it strictly, although "they have kept up appearances by moving their Sunday freight trains mostly at night and by having some alleged vegetable cars sandwiched in between those loaded with merchandise in order to give the appearance of a train load of perishable freight."

World's Largest Turbines.

The Brooklyn Heights Railroad Company has recently ordered two 7,500 k.w. turbine type generating units from the Westinghouse Companies. These units will be the largest generating units of the turbine type in the world. With the guaranteed overload capacity of 50 per cent. above rating, the turbines will thus be capable of developing 16,000 brake h.p. and about 10,500 brake h.p. on normal load. The turbines will operate on dry steam at 175 lbs. pressure and a vacuum of about 28 in. Three-phase, 25-cycle current will be generated directly at 11,000 volts for distribution to the line. The second and third largest turbine generating units in the world are also of the Parsons type, the former built abroad and the latter by the Westinghouse Companies at Pittsburg.

The Shallow Automatic Water Gage.

The accompanying illustration shows the shallow automatic water gage. This device automatically shuts the entrance to the glass water gage when the glass is broken, thereby preventing the escape of steam and hot water from the boiler. In the cross-sectional illustration A represents the boiler connection;



The Shallow Automatic Water Gage.

B, the stop valve seat; C, handle wheel for closing stop valve; D, automatic valve seat; E, automatic valve; F, cam for opening automatic valve; G, slotted key for operating cam device, and H, waterway to glass tube. When the glass is unbroken the boiler pressure from the upper and lower boiler connections balance and when the glass breaks the pressure at the broken point is atmospheric only, therefore the pressure from the boiler immediately drives the automatic valve E against its seat D, thus cutting off the hot water and steam and preventing it from escaping through the broken tube. The screw valve can be closed and the glass replaced at leisure, or if desired the glass can be replaced without even shutting off the screw valve. The automatic valve can be removed when boiler is under pressure, by simply closing the screw valve. The entire device is of bars and no springs are used in its operation. It works by boiler pressure only, therefore its action is positive. A number of these gages are in use and are giving satisfaction. They are made by the William S. Harris Co., Philadelphia, Pa.

Discriminating Rates in Vermont.

The Interstate Commerce Commission, in an opinion by Chairman Knapp, has rendered its decision in the case of the Capital City Gas Company, of Montpelier, Vt., against the Central Vermont and the Rutland Railroads in favor of complainant. The phrase "under substantially similar circumstances and conditions" is held to refer only to the matter of carriage; it is not permissible under that section for two or more carriers to establish a joint through rate, less than the sum of their locals, which is applicable only to a particular shipper or class of shippers. In this case the carriers made a joint rate of 90 cents a ton on bituminous coal from Norwood, N. Y., to Montpelier, Vt., when intended for "railroad supply," while for such coal carried between the same points and used for manufacturing or other industrial or domestic use, $1.85 was charged. These rates are held to constitute unlawful discrimination.

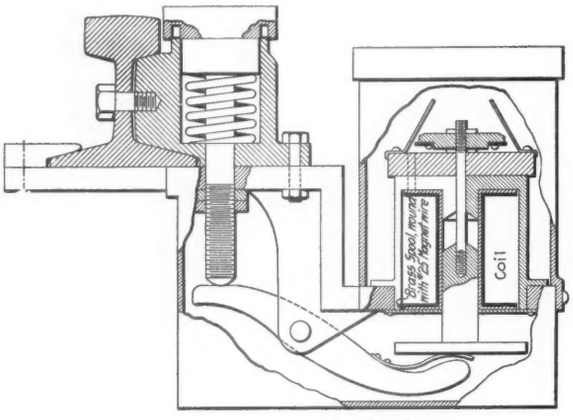
George Edward Macklin.

George Edward Macklin, a Director and General Manager of the Pressed Steel Car Company and well known in engineering circles throughout the country, died June 26 at St. Joseph's Hospital, Philadelphia, after a long struggle against consumption. He was 42 years old. Mr. Macklin was the son of George Macklin, who now lives in Colorado Springs, Colo. He was born at McVey Town, Pa., and was educated in the public schools near his home. He graduated from the Rensselaer Polytechnic Institute at Troy, N. Y., with high honors. Mr. Macklin's first important position was with the Colorado Fuel & Iron Company at Salina, Kan. He resigned to fill a position with the Simplex Railway Appliance Company, and went to the Pressed Steel Car Company in 1899. He was first connected with the sales department, and was transferred to the New York office with the title of Assistant General Sales Agent. He was soon returned to Pittsburg, was appointed Acting General Manager, and then elected General Manager and a director. He was also made General Manager of the Pennsylvania Car Wheel Company. While serving this dual capacity Mr. Macklin's health began to break down and he was forced to spend much of his time in the mountains at Colorado. In spite of his full knowledge of his condition he remained cheerful and deeply interested in his duties. He came to Pittsburg during the milder weather and returned to Colorado in the winter season. His sunny temperature won for him hosts of friends.

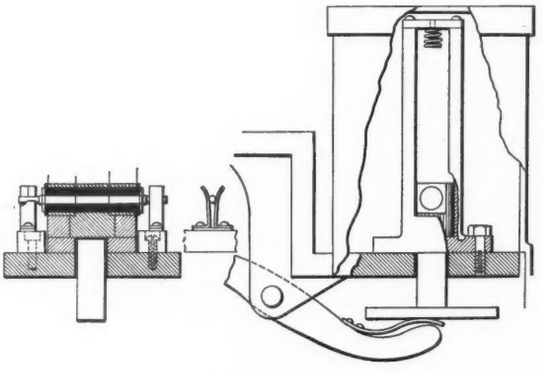
Mr. Macklin was a member of the John H. Brown Lodge, F. & A. M., of Buffalo; Salina Chapter No. 18, R. A. M., and MacKey Lodge No. 2, A. and A. S. R., of Salina, Kan. He was a member of the Duquesne Club, Pittsburg Club and Country Club of Pittsburg, the Lawyers' Club, the Central Railroad Club, New York Railroad Club, the Ardsley Club of New York, and the Chicago Club. The funeral of Mr. Macklin was held from the home of his aunt, Mrs. Eskin V. Smith, No. 1517 North Sixteenth street, Philadelphia, at 3.30 o'clock Wednesday afternoon.

A New Crossing Alarm.

The electric crossing alarm shown herewith has been in operation for the past eight months on the Aurora, Elgin & Chicago interurban electric line. As seen by the drawings, the mechanism is simple. The actuating device comprises a plunger held in a suitable metal frame or cup secured to the track rail, the position of the plunger being such as to be depressed by the tread of a passing wheel. The downward pressure of the wheel acts on a lever, the opposite end of which raises the armature of a solenoid. The upper end of the armature by coming in contact with two clips screwed to the top of the frame, closes an electric circuit through the bell at the crossing and through the solenoid, which is in series with the bell. This actuating device is placed at any desired distance from the crossing.



Actuating Lever.



Releasing Lever.

Sauer & Johnson's Highway Crossing Bell.

The releasing device at the crossing is similar to the actuating device, but the outer end of the lever raises a T-shaped piece, the upper part of which moves in guides. This upper or cross part has a hole drilled through its length in which is inserted a short length of brass wire in an insulating tube. This wire forms a part of the bell circuit and its ends rest between two clips as shown in the detail. Upward pressure of the lever raises the wire out of the clips and breaks the circuit, permitting the solenoid armature of the actuating device to drop to its normal position.

The device may be operated by one or two cells of battery, or from the power circuit, where there is one, as in the present case. In such case a series of incandescent lamps is placed in the circuit to furnish the necessary resistance, and the bell is connected in multiple with one of the lamps. The lamps are placed in a suitable hood at the top of the bell post and will flash a colored or a clear light, as desired, at right angles to the track, thus furnishing a visible as well as an audible signal.

The device is the invention of Joseph Sauer, Wheaton, Ill., and S. E. Johnson, Lombard, Ill., employees of the Aurora, Elgin & Chicago.

The New Kennicott Plant.

Owing to a typographical error, the dimensions of the new Kennicott water softening plant at Chicago Heights, Ill., were incorrectly stated last week. The main building is to be 80 ft. wide by 300 ft. long, together with additional office buildings, drafting room, laboratories, power house, and machine shop.

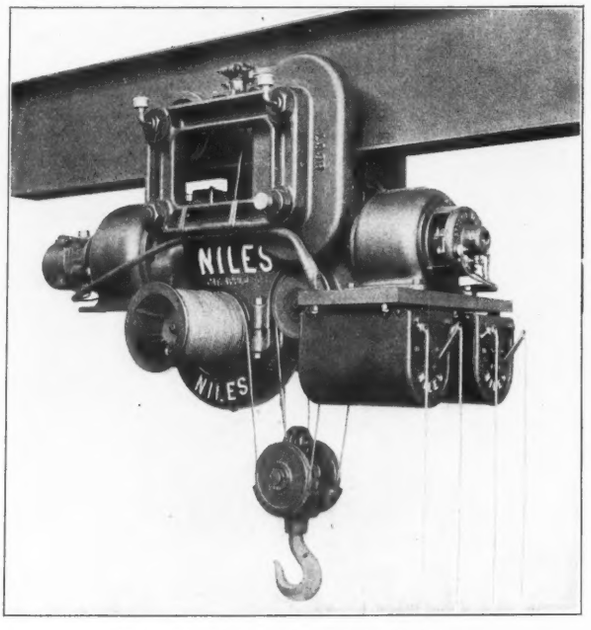
Iowa State University.

The School of Applied Science of the State University of Iowa has been reorganized into a college, and the present director of the school, Professor William G. Raymond, has been made dean. A new fireproof building is being built, and is expected to be in service before the end of this year. A contract has been let for the building of a dam across the Iowa River below the university grounds. This dam, besides providing a sheet of slack water about two miles long on which the university borders, will provide power for the institution, and for experimental purposes. There will be built near one end a canal across which removable dams of various sections will be placed for the study of flow.

New Niles Electric Traveling Hoist.

The new Niles electric traveling hoist shown in the accompanying illustration, is designed for hard continuous service, and fully comes up to this company's standard in quality of work and design of details. As may be seen in the illustration, the hoist is of compact design, and is self-contained in one heavy cast-iron frame to which the motors are attached end on. The power is transmitted directly from the armature shaft to the drum shaft through one train of worm wheel gears. The traversing mechanism is also driven through one train of worm and worm wheel gears, similar to the hoisting mechanism, except that, when the trolley is arranged to run on a single I-beam, double sets of transmission gears are used. All the mechanism is enclosed in oil and dust-proof casings, and is absolutely noiseless in operation. In addition to the braking effect obtained by the use of the worm and worm wheel, a powerful electric brake is attached to the hoist motor. These hoists when mounted on a traveling bridge, may be used as small capacity cranes. When used as cranes, the hoists are arranged to run between the two I-beams or channels of the bridge, and the controllers for raising and lowering the hook and operating the traversing mechanism may be placed either on the hoist, on the bridge, and operated by cords from the floor, or in an operator's cage attached to the bridge.

The Niles hoists are built in capacities of ¾ to 6 tons, and are usually arranged to run on an I-beam track. They will run on straight and curved tracks, and are generally provided with a separate motor for traversing, but if desired, hand traverse may be furnished, or all the traversing mechanism may be omitted and the trolley moved along the track by pushing on the load. The increased service with the electric traverse, however, much more than compensates for the slight additional cost.



A New Electric Traveling Hoist.

Fast Time by Turbine Steamers.

The Allan liner "Virginian," a turbine boat, has beaten all records for the transatlantic passage by the southern route between Moville and Cape Race. She left Moville at 2 2 p. m. on June 9 and reached Cape Race at 9 p. m., June 13, making the trip in four days and eleven hours. The "Virginian" previously held the record for this passage, which is now lowered by about five hours.

Reports also come from Elbing, Germany, of a fast trial trip of a turbine torpedo boat, built at the Schichau Works, which averaged 27.8 knots per hour for three hours with a maximum speed of 29½ knots an hour.

Electric Railway Exhibitions in London.

At the Royal Agricultural Hall, Islington, London, on July 3, a ten-days' exhibition of electric railway and tramway apparatus and appliances is to be opened. As usual, meetings of electric railway officials have been arranged for during this exhibition. Late in September, there is to be a large electrical engineering exhibition at Olympia, London, to include all departments of electrical work, at which all the leading British manufacturers will be represented. It is planned to make this the largest exhibition held in Great Britain since the Crystal Palace display in 1892.

The Panama Canal.

President Roosevelt has called a meeting of the Board of Consulting Engineers of the Isthmian Canal Commision, to be held at Washington, September 1. The order provides that if it is deemed necessary the Board can proceed to the Isthmus. The most important work of the Board will be to decide whether the canal shall be a sea level or a lock canal. The order directs the Canal Commission to "have all the proposed plans in such detailed form, with maps, surveys and other documents sufficient to enable the consulting engineers to consider and decide the questions presented to them."

The Board of Consulting Engineers consists of the following, Gen. George W. Davis having been designated by the President to act as chairman: Gen. George W. Davis, Alfred Noble, William Barclay Parsons, William H. Burr, Gen. Henry L. Abbot, Francis P. Stearns, Joseph Ripley, Isham Randolph, Herman Schussler, Henry Hunter, nominated by the British government; Herr Eugen Tincauzer, nominated by the German government; M. Guerard, nominated by the French government; M. Quellennec, consulting engineer of the Suez canal, and one to be designated by the government of the Netherlands.

The meetings of the Board are to continue as long as its members deem necessary before they report to the Commission.

London Underground Tramway Lines.

The London County Council trams carried, during the year ended March, 1905, 164,818,560 passengers, an increase of 31,679,475 over the corresponding period in 1904. About 36 per cent. of the passengers were carried at a one-cent fare. The average fare per passenger was just under two cents and showed a very slight increase over 1904. The net receipts were largely increased by the adoption of roof covers for the double-deck cars, a development which has spread not only in London, but in the chief cities in the provinces. The number of car miles run was 14,081,397. The net surplus balance on the lines controlled by the London County Council was 29,988.

A Railroad to the Bullfrog District.

According to a report in the New York *Herald*, a railroad is to be built in Nevada which will be the "cheapest ever." It is to run from Las Vegas, a new town on the San Pedro, Los Angeles & Salt Lake, to the Bullfrog mining district in Southern Nevada. The distance to Rhyolite, the principal camp in the Bullfrog district, is 120 miles, over a desolate and waterless alkali desert. It is said that the track is to be made of light contractors' rails, and evidently the purpose is to have it match contractors' track in quality—in the excellence of its line and surface. The vehicles are to be automobiles. These are to be like the large omnibuses seen in cities, except that they will have flanged wheels. What speed will be maintained on this railroad is not mentioned.

Flexible Steel—Armored Hose.

The flexible steel-armored hose, shown in the accompanying illustrations, is made by the Sprague Electric Company, New York. It consists of a rubber hose completely encased in a flexible steel tube so that no part of the rubber is exposed even on a bend. Not only is the hose thus thoroughly protected from outside injury, but the steel wrapper binds the rubber so tightly that it prevents expansion and thereby lessens the strain on the hose from the pressure within. The first illustration shows the construction of the armor around the rubber hose, and the second illustrates the reinforcing bushing which strengthens the terminal joint without interfering with the flexibility of the hose. A numebr of prominent railroads are now using this hose for steam heating, air brake and signal work.

The Sprague Flexible Steel-Armored Hose.

The London District Railway.

On June 13, the Metropolitan District Railway began operating by electricity its line between South Acton and Hounslow Barracks. By July 1, it is intended to have several other lines operated by electricity, with a through run from the West End terminus to Whitechapel. The service on the Ealing, Harrow & Hounslow lines has been greatly improved and a new station has been opened at South Acton.

Great Indian Peninsula Railway.

This road has, for the first time since its consolidation with the other government lines in India, succeeded in earning a surplus in the lean half year ending December 31. The Great Indian Peninsula operates 2,745 miles, which includes a recent increase of 63 miles from Delhi to Kosi, put in operation a few months ago. One very encouraging fact is that the traffic between Bombay and Poona has increased so rapidly of late that it will be necessary to double track the last remaining section of 40 miles between these points. Plans for this improvement now await government sanction.

Proposed Railroads in the Philippines.

W. H. Taft, Secretary of War, speaking of the Philippine Islands, says: The street railway now in operation, with the extensions which are planned, will give Manila and its suburbs a system of transit far ahead of anything in the Orient. Bids are to be opened on November 1 for the construction of over a thousand miles of railroad lines, which will open up immense tracts of virgin territory. With my party visiting the islands this summer will be John F. Stevens, an expert in railway engineering, who goes to the islands in the employ of the insular government. If the bids opened on November 1 are accepted he will remain with the government three years and supervise the construction of the entire system.

Manufacturing and Business.

The Damascus Brake Beam Co. announces that the machinery was not injured in last Sunday's fire at its Sharon, Pa., plant. The building will have been repaired within ten days from the time of the fire. Work was resumed at once and deliveries were not interrupted.

The Bethlehem Steel Co. is at work on three crank shafts which will weigh 86,600 lbs. each when finished. They are turned out of solid steel ingots 25 ft. x 4 ft. x 4 ft., and are intended for three Snow gas engines, which are to drive 4,000-kw. Crocker-Wheeler alternators. These are the largest gas engine-driven generators ever built. They were ordered by the California Gas and Electric Corporation.

Mr. Charles A. Bingaman was the predecessor as Mechanical Engineer of the Lima Locomotive & Machine Co. of Mr. George L. Wall, whose appointment was noted last week. Mr. Bingaman had held the position from November, 1900, to February of this year, when he resigned on account of serious ill health. For some months the position was held open for him, but as he was for some time unable to return to work, the appointment of Mr. Wall was made.

The Railway Electric Power Co., 114 Liberty street, New York, has been formed to acquire all the Ganz electric traction patents and manufacturing rights covering the United States, Mexico, Cuba and all the West Indies, other than the islands under British supremacy. The company is interested in installing the three-phase system, as used on the Valtellina Line of the Italian State Railways, recently described in the *Railroad Gazette*. Stephen Peabody is President; Leopold Wallach, First Vice-President; Gustave Leve, Second Vice-President; John E. Borne, Treasurer, and Henry L. Sprague, Secretary. In addition to the officers, William L. Bull, Henry Seligman and H. R. Duval are directors. L. B. Stilwell and Frank N. Waterman are the consulting electrical engineers.

Iron and Steel.

The Bessemer & Lake Erie has given a contract to the Carnegie Steel Co. for about 2,100 tons of steel ties to be laid along 10 miles of its road.

Bids were opened last week at the Navy Department for eight 10-in. guns, for which the Bethlehem Steel Co. made the lower bid at $43,800 each, the Midvale Steel Co. being the only other bidder.

MEETINGS AND ANNOUNCEMENTS.

(For dates of conventions and regular meetings of railroad conventions and engineering societies see advertising page 24.)

National Convention of Railroad Commissioners.

At the next convention of this organization, to be held at Deadwood, S. Dak., August 16, committee reports will be presented on the following subjects: Classification of Operating and Construction Expenses of Electric Roads; Grade Crossings; Railroad Taxes and Plans for Ascertaining the Valuation of Railroad Property; Powers, Duties and Work of State Railroad Commissioners; Railroad Statistics; Legislation; Safety Appliances; Delays in Enforcing Orders of Railroad Commissions; Classification and Simplification of Tariff Sheets; Rates and

Rate Making, and Amendment of the Act to Regulate Commerce. Edward A. Moseley, Washington, D. C., is Secretary.

Iowa Railway Club.

At the monthly meeting of this club in Des Moines June 12, H. H. Polk, President of the Interurban Railway Company of Des Moines, read a paper on "Freight Traffic of Interurban Roads." Mr. Polk showed by figures taken from the last census that the freight and express earnings of all the interurbans in the United States was only 5.6 per cent. of the gross earnings. He said that the possibilities for interurban roads acquiring freight business were almost unlimited. If properly developed that department would soon be producing its share of the earnings. It should be the policy of all interurban companies to put in side tracks, stock yards and loading chutes wherever they will be used. Mr. Polk said that the interurbans of the west were better built than those in the east, and were better prepared to handle heavy freight.

PERSONAL.

—Mr. Charles R. Hudson, who resigns the Presidency of the San Antonio & Aransas Pass to become Vice-President of the Mexican Central in charge of the operating department, was General Freight and Passenger Agent of the Sonora and of the New Mexico & Arizona railroads from 1887 to 1889. For nine years, from 1890 to 1899, he was Assistant General Freight Agent of the Atchison, Topeka & Santa Fe. In 1899 he was appointed General Freight and Passenger Agent of the Mexican Central. This position he held until 1903, when he resigned to become President of the San Antonio & Aransas Pass. He now leaves this road to return to the Mexican Central, with headquarters in the City of Mexico.

—Mr. J. P. O'Brien, who has been appointed General Manager of the Oregon Railroad & Navigation Co. and the Southern Pacific lines in Oregon, began railroad work in 1889 at St. Joseph, Mo. In May, 1890, he was appointed Assistant Superintendent of the St. Joseph & Grand Island. In October of the same year he went to the Union Pacific, and in 1892 to the Iowa Central. In 1893 he was appointed Superintendent of this road. In March, 1894, he was appointed

General Superintendent, but left in August to go to the Oregon Railroad & Navigation Co. as Superintendent at Portland, Ore. Later he was appointed Superintendent of Rail Lines and in 1904 General Superintendent. On June 1 he was promoted to be General Manager.

—Mr. Andrew Onderdonk, General Manager of the New York Tunnel Co., died June 2 at the age of 56, following a two-months' illness. He had been in the contracting business for 35 years. Before 1880 he was contractor for the harbor improvements at San Francisco, involving an expenditure of several million dollars. From 1880 to 1885, he built the Western division of the Canadian Pacific, 400 miles through British Columbia, which cost some $18,000,000, and during 1886 he built the Entre Rios Railway in South America. He also built the Chicago water tunnel into Lake Michigan, a large part of the Trent Valley canal for the Canadian Government, half of the Victoria bridge at Montreal and a double-track railroad tunnel at Hamilton, Ont. He was a partner in the Union Bridge Co. when that company built the Northwestern Elevated Railway in Chicago. At the time of his death, Mr. Onderdonk was engaged in dredging Ambrose Channel for the United States Government at a cost of over $10,000,000; also in the completion of the Jerome Park reservoir; and he had an interest in the New York Tunnel Co., which is building the subway tunnel under the East river from South Ferry to Brooklyn.

—Mr. William H. Quigg, who has been appointed Assistant General Freight Agent of the New Orleans & North-eastern, has spent most of his railroad life in Texas. His later

service has been in the traffic department of the Missouri, Kansas & Texas and the St. Louis Southwestern of Texas, of which latter road he was at one time Assistant General Freight Agent. He has also been General Freight and Passenger Agent of the Arkansas Southern. His latest promotion was from the position of Local Freight Agent of the Vicksburg, Shreveport & Pacific at Shreveport.

—Mr. R. K. Rochester, who has been appointed Principal Assistant Engineer of the Vandalia, is 26 years old. He spent his summer vacations while at school in different kinds of railroad work, being in charge, during the summer of 1900, of dock construction for the Algoma Central & Hudson Bay at Sault Ste. Marie. This was before he graduated, in 1901, from the civil engineering department of the Rose Polytechnic Institute at Terre Haute. From college he went to the service of the American Car & Foundry Co. In January, 1902, he was appointed Assistant Engineer of the Terre Haute & Logansport, and later the same year was made Engineer of Maintenance of Way of the Terre Haute & Logansport and the Logansport & Toledo, which form the Michigan division of the Vandalia. This position he held until June 1, when he was appointed Principal Assistant Engineer at St. Louis in charge of new surveys and construction work.

—Mr. Frank Otis Melcher, who has been appointed General Manager of the Central and Northern districts of the Chicago, Rock Island & Pacific, was graduated from the

academic department of Tufts College in 1887. Immediately after graduation, he entered the service of the Fitchburg in the engineering department and served that company in various capacities until 1896, when he was appointed Chief Engineer. In the meantime, he had received from Tufts in 1895 the additional degree of civil engineer. For two years he was Chief Engineer of the road and in 1898 he was made General Superintendent. In November, 1902, he went to the Rock Island as Superintendent of the Iowa division, and on Feb. 15, 1903, was made General Superintendent of the Choctaw district. On June 15, he was promoted from this position to be General Manager of the Central and Northern districts, with headquarters at Chicago.

—It is reported that John F. Wallace, Chief Engineer of the Panama Canal Commission, has resigned. At the time we go to press, this resignation has not been officially announced.

—Mr. Joseph M. Coale, inventor, and Treasurer of the Coale Muffler & Safety Valve Company, died Friday, June 16, at Atlantic City, after two days' illness. He was 75 years old, and had been connected with the Pennsylvania Railroad Company for more than 50 years.

—Mr. Oliver Rowe, who has been appointed Superintendent of the Houston & Texas Central at Ennis, Tex., has been in the service of that company all his life. He began as operator in 1877 and was agent for eight years from 1879. In 1887 he was made despatcher, which position he held for 11 years, except for three years, from 1885 to 1888, when he was in the local freight office at Houston. In July, 1902, he was appointed Assistant Superintendent on the Second division, of which he is now promoted to be Superintendent.

—Mr. Raymond D. Starbuck, who has been appointed Assistant to the Chief Engineer of the Michigan Central, was born at Glens Falls, N. Y., and graduated at Cornell University. After engineering service on several railroads, he was put in charge, in 1903, of the grade reduction and change of line on the Michigan Central near Battle Creek. In November, 1903, he was appointed Assistant Engineer of the Canadian Pacific, and in June, 1904, was appointed Division Engineer in charge of maintenance and sur-

veys on the Saginaw and Mackinaw divisions. In September of last year he was transferred as Division Engineer to the Western division.

—Mr. David M. Knox, who has been appointed Mechanical Engineer of the Denver & Rio Grande, is a graduate of the mechanical engineering course at Purdue University. He worked for eleven years as draftsman on the Union Pacific and has since been employed at the Dickson Works of the American Locomotive Co., and by the Westinghouse Electric & Manufacturing Co. Since January, 1904, he has been Mechanical Engineer and Acting Master Mechanic on the Denver, Northwestern & Pacific, which post he recently left to become Mechanical Engineer of the Denver & Rio Grande.

—Mr. W. S. Tinsman, who has been appointed General Superintendent of the Choctaw district of the Chicago, Rock Island & Pacific, was born in 1867 and began railroad work at the age of 14 as a messenger boy on the Rock Island. In two years he was made operator and a few years later despatcher; and then successively chief despatcher, trainmaster, Superintendent of the Chicago Terminal division and Superintendent of the Oklahoma division. His last previous promotion was in 1904, when he was made Superintendent of the Missouri division. This position he leaves to become General Superintendent.

—H. B. Titcomb, who has been appointed Resident Engineer of the Southern Pacific at Bakersfield, Cal., was born in 1867 and is a graduate of Cogswell Polytechnic College of the class of 1891. Previous to his graduation he had worked during summers as assistant agent and operator for the Southern Pacific. In 1896, he was made Assistant Engineer on the Western division, with headquarters at Oakland Pier. In April, 1900, he was appointed roadmaster, and in November of the same year Principal Assistant Engineer on the Sacramento division. On Nov. 20, 1904, he was appointed Assistant Resident Engineer of the Sacramento division in charge of bridges, buildings and snowsheds. He has now been promoted to be Resident Engineer of the San Joaquin division.

—Mr. William Coughlin, who has been appointed General Manager of the Kansas City Southern, was born Jan. 11, 1856, and began railroad work in 1872 on the Chicago, Rock Island & Pacific, where he served for 10 years in the maintenance of way and operating departments. At the end of that time he went to the Texas & Pacific first as freight conductor and later as roadmaster, but soon returned to the Rock Island and served four years as foreman and conductor of work train. In 1886 he was made roadmaster on the Chicago, Milwaukee & St. Paul, and two years later went to the Missouri Pacific as roadmaster. In 1890 he was appointed Superintendent of that road at Atchison, Kan. In 1896 he was made Superintendent, and in 1898 Assistant General Superintendent of the St. Louis Southwestern. He went to the Kansas City Southern as Superintendent in 1899, which position he held for three years. In 1903 Mr. Coughlin was appointed General Superintendent of the Denver & Rio Grande. He resigned June 1 to become General Manager of the Kansas City Southern.

ELECTIONS AND APPOINTMENTS.

Atchison, Topeka & Santa Fe.—C. M. Buck, Assistant Engineer at Marceline, Mo., has been appointed Office Engineer, succeeding G. W. Smyser, resigned. H. W. Wagner, Assistant Engineer at Arkansas City, Kan., has been transferred to Marceline, succeeding Mr. Buck. H. S. Hughes succeeds Mr. Wagner as Assistant Engineer, with headquarters at Arkansas City, Kan.

Baltimore & Ohio.—H. M. Matthews, Division Freight Agent and Coal and Coke Agent at Pittsburg, has been appointed General Coal and Coke Agent at Baltimore, succeeding J. A. Murray, deceased.

Buffalo & Susquehanna.—M. J. McMahon has been appointed Assistant General Freight and Passenger Agent, with headquarters at Galeton, Pa. The office of Division, Freight and Passenger Agent, previously held by Mr. McMahon has been abolished.

Chicago & Eastern Illinois.—E. J. Knickerbocker, Division Freight and Passenger Agent at Mt. Vernon, Ill., has been appointed Coal Traffic Manager of the Chicago & Eastern Illinois, Evansville & Terre Haute and Evansville & Indianapolis, with headquarters at Chicago, succeeding H. H. Rhodes, resigned. Mr. Rhodes has been appointed General Sales Agent of the Consolidated Indiana Coal Co.

John L. Davis, heretofore Chief Despatcher of the Pittsburg, Cincinnati, Chicago & St. Louis, has been appointed Superintendent of Telegraph of the C. & E. I., with headquarters at Chicago, succeeding F. H. Van Etten.

Chicago, Burlington & Quincy.—The following directors have resigned from the board of the Chicago, Burlington & Quincy Railroad: E. H. Harriman, Mortimer L. Schiff, H. McK. Twombly, E. T. Nichols and George J. Gould. They are succeeded by George C. Clark, James N. Hill, Samuel Thorne, George F. Baker and John J. Mitchell.

J. H. Dacey, Master Mechanic at St. Joseph, Mo., has resigned. See Wabash.

Chicago, Indianapolis & Louisville.—Lewis H. Parker, Superintendent at Lafayette, Ind., has resigned.

Chicago, Rock Island & Pacific.—W. S. Tinsman, Superintendent of the Missouri division, has been appointed General Superintendent of the Choctaw district, with headquarters at Little Rock, Ark., succeeding F. O. Melcher, promoted.

The maintenance of way department will, beginning July 1, be under the supervision of the General Managers.

W. M. Whittenton, Superintendent of the Arkansas division, with headquarters at Little Rock, has been appointed Superintendent of the Missouri division, with headquarters at Trenton, Mo., succeeding W. S. Tinsman, promoted.

Denver & Rio Grande.—W. J. Donovan, Assistant Superintendent of the Second division, with headquarters at Minturn, Colo., has resigned.

El Paso & Southwestern.—A. L. Hawley, Auditor, has been appointed Auditor also of the El Paso-Northeastern System.

Erie.—O. F. Barnes, formerly General Roadmaster of the Pittsburg, Shawmut & Northern, has been appointed Division Engineer, with headquarters at Rochester, N. Y.

R. W. Burnett, Assistant Master Car Builder, has been appointed Master Car Builder, with headquarters at Meadville, Pa., succeeding R. Gunn.

Halifax & Southwestern.—G. C. Farish, Auditor, has been appointed Acting Superintendent of the Halifax & Yarmouth Railway division, succeeding Clark Cooper, resigned.

Illinois Central.—W. A. D. Short, Superintendent of Signals of the Queen & Crescent Route, has been appointed Signal Engineer, with headquarters at Chicago, succeeding Charles Dunham, now Signal Engineer of the Great Northern.

Lake Shore & Michigan Southern.—Thomas A. Palmer has been appointed Paymaster, with headquarters at Cleveland, succeeding E. C. Sheldon, resigned.

Leavenworth, Kansas & Western.—J. O. Brinkerhoff, Acting General Manager, has been appointed Superintendent, with headquarters at Kansas City, Mo.

Lehigh Valley.—John W. Platten, Second Vice-President, has resigned, effective September 1, to become Vice-President of the United States Mortgage & Trust Co.

Mexican Central.—C. R. Hudson, formerly President of the San Antonio & Aransas Pass and recently elected Vice-President of the Mexican Central, will have charge of the operating department, with headquarters at the City of Mexico.

Mexican International.—D. P. Bennett, Assistant to the President, has been elected Vice-President, with office at New York. J. M. Frazer has been appointed Treasurer, succeeding A. H. Mackie, and John H. Guess, Secretary and Assistant Treasurer; A. Arriaga has been appointed Assistant Secretary, and Emilio Velasco, General Counsel, all with offices at Mexico City. All hold similar offices on the National of Mexico.

Michigan Central.—W. S. Kinnear, Assistant General Manager and Chief Engineer, has retired from the position of Chief Engineer in order to devote his time to building the Michigan Central's tunnel under the Detroit river. He is succeeded as Chief Engineer by George H. Webb, Assistant Chief Engineer. Mr. Webb's headquarters are at Detroit. R. D. Starbuck, Division Engineer of the Western division, has been appointed Assistant to the Chief Engineer, with headquarters at Detroit. Mr. Starbuck is succeeded as Division Engineer, with headquarters at Niles, Mich., by George H. Harris, Assistant Engineer of the Oshtemo division.

G. E. Hustis has been appointed Auditor of Disbursements, with office at Detroit. The title of Thos. Eedson, Freight Accountant, has been changed to Auditor of Freight Accounts, and that of H. J. Broderick, Ticket Accountant, to Auditor of Passenger Accounts.

Missouri, Kansas & Texas of Texas.—The Trinity division from Colmesneil, Tex., to Trinity, 66 miles, has been transferred from the jurisdiction of J. H. Davisson, Superintendent at Smithville, to that of W. C. Williams, Superintendent at Greenville.

Oregon Railroad & Navigation.—D. B. Smith, Superintendent of the Ilwaco Railway & Navigation Co., has been appointed Assistant Superintendent of the Washington division of the O. R. R. & N., with headquarters at Tekoa, Wash.

Pittsburg & Lake Erie.—The authority of J. R. Smart, Superintendent of Dining Car Service of most of the New York Central Lines, has been extended over the Pittsburg & Lake Erie.

Queen & Crescent Route.—W. A. Shoemaker, Secretary of the Cincinnati, New Orleans & Texas Pacific, has resigned to go into private business.

St. Louis & San Francisco.—The jurisdiction of C. D. Purdon, Engineer of Maintenance of Way, has been extended over the Third district. M. C. Byers, Engineer of Maintenance of Way of the Third district, with headquarters at Cape Girardeau, Mo., has been transferred to St. Louis in charge of special work in connection with maintenance of way, reporting to the Second Vice-President and General Manager. The office of Engineer of Maintenance of Way of the Third district and the office of Division Engineer on all divisions has been abolished and maintenance of way will be under the jurisdiction of the Division Superintendents. The Clinton district from Springfield, Mo., via Clinton to Kansas City, has been detached from the Northern division and made part of the First district of the Eastern division.

San Antonio & Aransas Pass.—C. R. Hudson, President, has resigned to become Vice-President of the Mexican Central.

Southern Pacific.—W. C. Edes has been appointed District Engineer of Maintenance of Way, with headquarters at San Francisco.

Alan D'Heur, formerly Resident Engineer at Bakersfield, Cal., has been appointed District Engineer of Maintenance of Way, with headquarters at Los Angeles, Cal.

Toledo, St. Louis & Western.—Charles E. Spencer has been elected Secretary and Treasurer, succeeding J. H. Seaman, resigned.

Trinity & Brazos Valley.—Michael Sweeney, formerly General Superintendent of the Iowa Central and the Minneapolis & St. Louis, has been appointed General Manager and Superintendent of Construction of this road, which will be the Gulf division of the Colorado & Southern.

Wabash.—George W. Mudd, Master Mechanic at Moberly, Mo., has resigned.

J. H. Dacey, Division Master Mechanic of the Chicago, Burlington & Quincy, has been appointed Master Mechanic, with headquarters at Moberly, Mo., succeeding George W. Mudd, resigned.

George G. Yeamans has been appointed Assistant to the First Vice-President, with office at Chicago.

Wabash-Pittsburg Terminal.—C. McK. Watts, Principal Assistant Engineer, and W. J. Coursin, Assistant Engineer, have resigned.

Washington Railroad Commission.—H. A. Fairchild has been appointed Chairman and John S. McMillan and J. C. Lawrence, members of the Washington Railroad Commission, which was created by the last legislature.

Western Pacific.—E. T. Jeffery has been elected President, succeeding William J. Barnett. Mr. Barnett has been appointed Vice-President and General Counsel. The following officers have also been elected: Jesse White, Vice-President; Virgil C. Bogue, Vice-President and Chief Engineer; J. Dalzell Brown, Treasurer; S. M. Bradburg, Secretary. The following have been elected new directors: J. H. Vaile and A. H. Calef, of the Missouri Pacific; Franklin W. M. Cutcheon, Warren Olney, H. Yard and W. J. Shotwell. The executive committee is composed of E. T. Jeffery, W. J. Barnett, J. Vaile, A. H. Calef and Jesse White.

Wheeling & Lake Erie.—George T. Barnsley, Resident Engineer of the Wabash-Pittsburg Terminal, has been appointed Chief Engineer of the Wabash lines east of Toledo, including the Wheeling & Lake Erie, Wabash-Pittsburg Terminal and West Side Belt.

Wisconsin Railroad Commission.—The following are the members of the Wisconsin Railroad Commission: To serve for four years, Professor B. H. Meyer, of the University of Wisconsin; to serve for six years, Halford Erickson, Commissioner of Labor and Industrial Statistics; for eight years, John Barnes, a lawyer.

LOCOMOTIVE BUILDING.

The International & Great Northern is reported to have ordered 15 large freight locomotives.

The Pennsylvania is reported to have ordered 150 locomotives from the Baldwin Works. These are in addition to the large orders from the Baldwin Works earlier in the year.

The Metropolitan District Railway, of London, is reported to have ordered 10 electric locomotives from the Westinghouse Electric & Manufacturing Co. These locomotives will be of 1,200 h.p. and will be expected to draw 120-ton trains at an average speed of 36 miles an hour. They will be equipped with four motors each of 300 h.p. capacity.

CAR BUILDING.

The Cleveland & Southwestern (Interurban) has ordered ten 51-ft. combination baggage, passenger and smoking cars from the St. Louis Car Co.

The Ironton Railroad has ordered 10 hopper gondola cars of 60,000 lbs. capacity from A. V. Kaiser & Co., of Philadelphia.

The United Railways & Electric Company, of Baltimore, has ordered 40 high-speed cars and 160 medium-speed cars from the J. G. Brill Co., for delivery during the fall.

The Missouri, Kansas & Texas is reported to have ordered 250 ventilated box cars, 50 40-ft. flat cars and 50 cabooses from the American Car & Foundry Co. and 100 convertible ballast cars from the Rodger Ballast Car Co.

The Union Pacific will build six steel gasolene motor cars at its Omaha shops. These cars are to weigh 55,000 lbs. and measure 54 ft. long, 8 ft. 10 in. wide and 8 ft. 4 in. high, all inside measurements. The special equipment will include: Commonwealth bolsters, Waycott brake-beams, Union Pacific specially designed seats and trucks and Schoen rolled steel wheels.

The Tehuantepec National has ordered 125 box and 30 stock cars, all of 60,000 lbs. capacity, from the American Car & Foundry Co., for July and August delivery. All cars will weigh 14,500 lbs., and measure 35 ft. long, 9 ft. wide and 6 ft. 9 in. high, all inside measurements. The special equipment for both classes will include: Midvale steel axles and bolsters, National-Hollow brake-beams, Christie brake-shoes, Westinghouse air brakes, Tower couplers, National malleable door fastenings, Wagner doors and Diamond arch-bar trucks.

BRIDGE BUILDING.

CLEVELAND, OHIO.—An ordinance is before the City Council asking for an appropriation of $25,000 to build a bridge over the Wheeling & Lake Erie tracks at Brookside Park.

COUNCIL BLUFFS, IOWA.—The supervisors of Pottawattamie and Harrison counties have ordered the establishment of a drainage ditch system for the relief of the Missouri river low lands in those counties. This improvement will cost more than $200,000. The Chicago & North-Western put in a claim for $38,000 for bridges which it will be compelled to build, but this claim was reduced to $10,000 by the appraisers.

MIAMI, FLA.—Bids are wanted July 31 by J. C. Meredith, Constructing Engineer of the Florida East Coast Railway, for building reinforced concrete arch work consisting of about 80,000 cu. yds. of concrete on its proposed Key West extension.

MUSKOGEE, IND. T.—The Missouri, Kansas & Texas is putting up a viaduct over its tracks at Court street.

PATERSON, N. J.—Bids will soon be asked for building a steel bridge 180 ft. long over the Passaic river at Killman street to cost about $32,000.

PIKEVILLE, KY.—Bids are wanted July 6 by the Board of Bridge Commissioners for building the concrete substructure, also for the steel superstructure of a bridge 150 ft. long with 16-ft. roadway.

PORTLAND, ME.—Bids are wanted July 8 by the Commissioners of the Portland bridge district for building a bridge over Fore river between Portland and South Portland. The bridge is to be approximately 1,348 ft. long, with 40-ft. roadway and 6-ft. sidewalks, and is to include a draw with either one or two openings.

READING, PA.—Bids are wanted June 30 by H. F. Livingood, County Controller, for building the Eagle Point bridge; also for building the Glendale bridge over Ironstone creek.

RUTHERFORD, N. J.—All the bids for rebuilding the bridge at this place have been rejected and new ones will be asked about the first of next month.

SPARTANBURG, N. C.—Bids are wanted July 5 by the County Commissioners for building a bridge over South Pacole; also for one over Lawsons fork. F. C. West, County Clerk.

Other Structures.

ALTOONA, PA.—The new wheel foundry of the Pennsylvania at South Altoona, which is one of the largest of its kind, having a capacity of 900 wheels a day, was put in operation on June 16.

FORT WORTH, TEX.—The St. Louis & San Francisco is planning to build shops at this place to cost about $55,000.

HAMILTON, OHIO.—The Cincinnati Northern Traction Co. has given a contract for putting up a new power plant to cost about $650,000.

HARRISBURG, PA.—Negotiations are under way between the Pennsylvania and the Cumberland Valley to jointly put up a large freight house here.

AUSTIN, TEX.—The Houston & Texas Central will put up a ten-stall roundhouse, also a machine shop, at this place.

HURON, OHIO.—The Wabash, (W. & L. E.) it is reported, has decided to spend a large sum in improving its dock property at this place, including modern coal and ore-handling machinery and extensive docks.

KNOXVILLE, TENN.—Local reports state that bids will be asked about August 1 for building an addition to the works of the William J. Oliver Manufacturing Co., in which car wheels will be made. The cost of the buildings will be about $60,000.

MORRISVILLE, PA.—The Pennsylvania, it is said, will put up a new engine house and repair shop here.

MUSKOGEE, IND. T.—The Missouri, Kansas & Texas will put up a brick freight house two stories high, 40 ft. x 233 ft.

NEWARK, N. J.—The Public Service Corporation has plans ready for putting up a large car building and repair plant.

NORTH ROCHESTER, PA.—The Pittsburg Bridge & Iron Works Co., with shops in Pittsburg, it is said, has bought a large plot of ground and will at once put up buildings at this place.

PARIS, TEX.—The Texas & Pacific ic putting up a combined passenger and freight house of brick and stone to cost $30,000.

PARSONS, KAN.—The Missouri, Kansas & Texas has completed negotiations with the city officials and will build large shops at this place.

PERRYVILLE, MD.—A contract has been given by the Philadelphia, Baltimore & Washington to Levi E. Patterson, of this place, for putting up a brick passenger station 1½ stories high, 22 ft. x 75 ft.

SALT LAKE CITY, UTAH.—The Rio Grande Western and the Western Pacific are planning to jointly build a large union passenger station.

WHEELING, W. VA.—Plans are being made by the Baltimore & Ohio for building a stone station at this place.

RAILROAD CONSTRUCTION.

New Incorporations, Surveys, Etc.

ASHEVILLE & CRAGGY MOUNTAIN.—President R. S. Howland, of this company, is quoted as saying that this road is now under construction from Craggy Mountain, N. C., to Democrat, a distance of 17 miles, three miles of which are completed. The R. H. Tingley Co., of New York, are the engineers.

ATCHISON, TOPEKA & SANTA FE.—Action has been taken by this company to repair the damages caused by high water and floods from the Rio Grande river, and it is said that the company will rebuild on higher ground the entire line through the Mesilla Valley. This valley is between El Paso and Albuquerque.

BEAUMONT & GREAT NORTHERN.—A charter has been granted this company in Texas, with a capital of $370,000, to build a rail-

road from Trinity, Tex., on the International & Great Northern, southeast for a distance of about 40 miles to Livingston, for which contracts will be let as soon as the line is located. The incorporators include: G. W. Pennell and William Carlisle, of Atchison, Kan.; J. E. Hill and W. H. Know, of Livingston; A. C. Bird, of Chicago, Ill., and others. (See Texas Roads, June 23, p. 207.)

BUFFALO, BATAVIA & ROCHESTER (BUFFALO & WILLIAMSVILLE) (ELECTRIC).—Permission has been granted by the Railroad Commission to this company, which has a capital of $3,000,000, to build an electric railroad from Williamsville, Erie County, N. Y., via Batavia to Rochester, a distance of about 65 miles.

CANADIAN NORTHERN.—This company is planning to build a connecting link in Manitoba from Emerson east to Vassar, a distance of about 75 miles.

CAPE BRETON.—The government has granted a subsidy to this company for extending its line from St. Peters, N. S., northeast to Lewisburg, a distance of about 65 miles.

CHICAGO, BURLINGTON & QUINCY.—An officer writes that this company has given a contract to J. H. Reynolds, of St. Louis, for grading and bridging the line from Centralia, Ill., to Herrin, Ill. The line runs south from Centralia through Woodlawn, Waltonville, Christopher and Plumfield to Herrin, about 52 miles. Grading work was begun last month. There is no heavy work, as the road runs through prairie lands, and there are no important bridges or trestles, except the one over the Big Muddy river.

CHICAGO, ROCK ISLAND & PACIFIC.—This company during the present year will expend $2,000,000 in improving its Iowa lines. Some heavy curves near Des Moines and the towns of Casey and Avoca are to be eliminated, and the heavy grades east of Des Moines are to be reduced. On the main line of the southwest division important changes will be made in the track between Washington and Centerville within the next eighteen months. The main line will be double-tracked from Iowa City to Valley Junction. The Winterset-Greenfield extension is not to be built this year, but probably will be built next year; the ultimate destination of this extension is Nebraska City.

DELAWARE, LACKAWANNA & WESTERN.—A contract has been given by this company to the Crary Construction Co. for building a third track for a distance of 30 miles east of Scranton. There is a heavy grade both east and west of Scranton and the new track will be used for freight trains to avoid congestion of passenger trains on this section.

GRAND TRUNK PACIFIC.—General Manager Morse, of this company, is quoted as saying that specifications for the Lake Superior branch are printed and bids will soon be asked for building the line. It will be 200 miles long. The company has secured land at Fort William, amounting to 1,600 acres, for terminal purposes.

GREAT NORTHERN.—This company has decided to build the Ashland (Neb.) extension by way of Fremont, instead of the route running several miles east of that city. The route selected is a few miles longer and will also require the construction of another bridge over the Platte river. The inducements offered by the citizens of Fremont were sufficient to warrant the company in making the additional expenditures necessary by the construction along this route. Rights of way are now being secured.

HANNIBAL & KIRKVILLE.—This company proposes to build a railroad, to be operated either by steam or electric power, from Hannibal, Mo., northwest to Kirkville, approximately 75 miles.

HOMAN & SOUTHERN.—Incorporation has been granted this company in Arkansas with a capital of $25,000, to build a railroad from Homan, in Miller County, northeast to Harvey, a distance of 10 miles. C. B. Kelley, H. G. McBurney, of Homan, and J. M. Stayton are interested.

HUNTINGTON, COLUMBIA CITY & NORTHWESTERN TRACTION.—A company under this name is planning to build an electric road from Huntington, Ind., north through Columbia City, skirting Lake Wawasee and through Syracuse to Goshen, a distance of 55 miles, and work is to be commenced during the present year. Rights of way are also being secured for an extension south from Huntington through Marion, Elwood and Noblesville to Indianapolis, an additional 95 miles. A. E. Weist, Jr., is General Manager.

INDIANAPOLIS, LOGANSPORT & SOUTH BEND TRACTION.—This company is planning to build a line from South Bend south to Logansport, Ind., through Bremen, Bourbon, Argos and Rochester. Rights of way have been secured and several townships have voted subsidies.

JOHNSON CITY SOUTHERN.—A charter has been granted this company in North Carolina with a capital of $355,000 to build a railroad from Marion, N. C., up the north fork of the Catawba and down the valley of the Toe river to the Tennessee line, where connection will be made with a road to Johnson City, a distance of about 71 miles.

KENTUCKY ROADS.—Rights of way are being secured by a new company, in which H. H. Molman and others of Madisonville, Ky., are interested, for a railroad from that place northeast to Cloverport, a distance of 80 miles. Rights of way through Muhlenberg and Breckinridge Counties have already been secured.

KOOTENAY CENTRAL (SOUTHERN PACIFIC).—Announcement has been made that the Canadian Pacific, under this name, will build a branch from Golden, B. C., south to Fort Steel, a distance of about 150 miles.

LAKE SUPERIOR & SOUTHEASTERN.—This company has filed a mortgage for $6,000,000 and will use part of the proceeds to build a line from Superior, Wis., southeast to Ladysmith, a distance of 125 miles. R. C. Young, of Marquette, Mich., is Chief Engineer.

MINOT, BISMARCK & SOUTHWESTERN.—Incorporation has been granted this company in North Dakota with a capital of $500,000 to build a railroad from Minot south for a distance of over 100 miles. The incorporators include: L. L. Davis, O. M. Chaplin, C. J. Brunner and J. R. Ehr, all of Minot.

NORTHERN PACIFIC.—A contract has been given by this company to Beumett & Wheeler, of Tacoma, Wash., for building a spur from Toppenish, Wash., on the main line, southeast towards Sunnyside, passing east of Snipes Mountain. Work is to be commenced at once.

ORANGE & NORTHWESTERN.—The contract recently given by this company for building its road from Buena, Tex., north to Newton, a distance of 31 miles, has been sublet to Contractors Ricker & Lee, of Galveston, and the work is to be commenced at once. (June 16, p. 199.)

OREGON STATE PORTAGE RAILROAD.—This road has just been completed from Celilo to Big Eddy, 8½ miles.

OUACHITA & NORTHWESTERN.—Application has been made by this company for a charter in Louisiana with a capital of $200,000 to build a railroad from Clarks, La., in Caldwell County, northwest to Weston, in Jackson County, a distance of about 30 miles. The incorporators include: F. C. Broadway, C. E. Slagle, J. T. Whitehead and others.

PENNSYLVANIA.—Bids have been asked for extensive improvements on the Pittsburg division by William H. Brown, Chief Engineer, for grading, masonry work and track laying for the completion of a four-track railroad between Southwest Junction and the west end of the Donohue tunnel. The work includes 400,000 cu. yds. of excavation, 500 cu. yds. of culvert masonry, 300 cu. yds. of overhead masonry, 50,000 lbs. of cast-iron drain pipe, and 30,700 ft. of track laying. Bids are also asked for the construction of a four-track line from the east end of the Donohue tunnel to Beatty. This includes 700,000 cu. yds. of excavation, 1,000 cu. yds. of bridge masonry, 50,000 lbs. of cast-iron drain pipe and 44,000 lineal feet of track laying; also for a change of line and a new yard on the Princeton branch. This work includes 100,000 cu. yds. of excavation and 17,000 lineal feet of track laying.

PORTLAND, NEHALEM & TILLAMOOK.—Work on the first 20 miles of this road has been commenced by the Atlas Contract Co., of San Francisco. The proposed route is from Portland, Ore., west through Washington County and thence south through Tillamook County.

ROCK ISLAND & MONMOUTH.—Incorporation has been granted this company in Illinois to build a railroad from Rock Island, Ill., south through the counties of Rock Island, Mercer and Warren to Monmouth, a distance of 50 miles. The incorporators and first board of directors include: J. E. McGrath, C. W. Church, T. A. Church and L. G. Church, all of Chicago.

ROODHOUSE & VIRDEN.—An officer writes that this projected road will run from Roodhouse, Ill., east through Delta, Scottville and Modesto to Virden, a distance of 32 miles. The work will be light and there will be needed only one bridge and a few trestles. It has not been definitely decided whether the road will be operated by electricity or oil or gas motors. E. M. Husted, of Roodhouse, is President and Chief Engineer.

ST. JOSEPH, ALBANY & DES MOINES.—As soon as the necessary right of way has been obtained construction work will be commenced on this proposed road from St. Joseph, Mo., northeast to Des Moines, Iowa, about 200 miles. President F. C. Mordaunt, of Chicago, is quoted as saying that the New York interests he represents have been endeavoring to buy the property and rights of the Des Moines, Iowa Falls & Northern. If this road is secured, connections will be made either with the Illinois Central or the Iowa Central, thus giving a direct route from St. Joseph to St. Paul. (See Construction Record.)

SOMERSET RAILWAY.—This company, which operates about 41 miles of road in Maine, has decided to build an extension from Bingham, the present terminus, to Birch Point, on the west shore of Moosehead Lake, a distance of about 50 miles. Contracts will be let in sections and work will begin on the Birch Point end. The extension will cross the Canadian Pacific at a point near the west outlet of Moosehead Lake.

SOUTH DAKOTA CENTRAL.—This company, which is building a line from Sioux Falls, S. Dak., north to Colton, has made application to the Secretary of State for permission to build extensions. The main line is to extend north from Colton through the counties of Lake, Brookings, Kingsbury, Hamlin, Codington, Day and Marshall, touching the towns of Wentworth, Brookings, Watertown and Waubay, with branches from Colton west to the Missouri river through the counties of Minnehaha, Hanson, Davison and Buffalo, and from a point near the northerly line of Lake County, through Kingsbury, Beadle, Hand, Hyde and Hughes Counties to the Missouri river; also from a point in Clark County through Spink, Hand, Hyde and Sully Counties, and from a point in Codington County through Clark, Spink, Day and Brown Counties to Aberdeen.

SOUTHERN.—A contract has been given by this company to W. J. Oliver & Co., of Knoxville, Tenn., for building the Rabun Gap extension from Maryville, Tenn., to Bushnell, N. C., a distance of 46 miles. From Bushnell the road will be extended to a connection with the main line of the Southern at Anderson, S. C.

SOUTHERN BOULEVARD (ELECTRIC).—Application has been made in New York City by this company for permission to build an electric road from the intersection of the Southern Boulevard and East 174th street to a connection with the Union Railway at the intersection of Crotona avenue and Pelham avenue, all in the borough of the Bronx.

Southern Pacific.—Application has been made to the Texas Railroad Commission for permission to build a cut-off on the Gonzalles branch of this road, which will reduce the distance between Harwood, Tex., and Gonzalles, about three miles. The work includes the building of a new bridge over the Colorado river.

Spokane-Columbia Railroad & Navigation Company.—Articles of incorporation have been filed in Washington by this company with a capital of $4,000,000 to build a railroad from Spokane southwest through Spokane, Whitman, Adams and Franklin Counties to the Columbia river, approximately 130 miles.

West Shore Traction.—Incorporation has been asked for by a company under this name in Alabama with a capital of $500,000 to build an electric road from Mobile south to Alabama Port, a distance of 22 miles. The company is said to be backed by New York capitalists and all rights of way have been secured.

RAILROAD CORPORATION NEWS.

Altoona & Logan Valley (Electric).—In connection with the call for the retirement of the divisional first-mortgage 5 per cent. bonds at 105, it has been announced that holders who desire to do so may exchange these bonds for the 4½ per cent. consolidated mortgage bonds issued Aug. 15, 1903. The exchange will be on the basis of $1,000 in the consolidated 4½ per cent. bonds and 5 per cent. in cash for each $1,000 5 per cent. bond. On the redemption of the first-mortgage bonds, the consolidated 4½ per cent. bonds become the first and only mortgage on all the property of the company.

Atchison, Topeka & Santa Fe.—Gross earnings for the month of May were $5,845,281, an increase of $506,797 over May, 1904. Net earnings were $1,774,913, a decrease of $41,670.

Atlantic Coast Electric.—Notice has been given by the reorganization committee representing about 75 per cent. of the $500,000 general mortgage bonds to the holders of outstanding bonds of this issue that the time for depositing the bonds has been extended for 30 days from June 21. The foreclosure sale under the final decree of the United States Circuit Court of Appeals will shortly take place.

Canada Atlantic.—The Bank of Montreal has recently offered $4,981,500 of the $16,000,000 consolidated first-mortgage 4 per cent. gold bonds of 1955 at 99. These bonds are guaranteed by the Grand Trunk. Of these bonds $2,000,000 are retained in the treasury for improvements and $2,908,000 are reserved to retire prior lien bonds maturing in 1909.

Chicago, Burlington & Quincy Railroad.—J. P. Morgan & Co. and Clark, Dodge & Co. are offering at 108 and interest $23,859,000 Illinois division 4 per cent. bonds of 1949. These are part of the issue of $85,000,000, of which $50,835,000 have already been issued as 3½ per cent. bonds, and $10,306,000 as 4 per cent. bonds. The whole issue may be retired as a whole at 105 and interest beginning 1930. The bonds are issued partly to retire the $19,699,000 consolidated mortgage bonds which matured in 1903 and were extended to July 1, 1905. On that date they will become an absolute first-mortgage on all of the lines east of the Mississippi river. The consolidated mortgage bonds maturing July 1 will be received in payment for these bonds at par and interest.

Central of Georgia.—For the month of May, gross earnings were $763,553, an increase of $103,425. Operating expenses and taxes decreased $17,743. Net earnings were $152,701, against $31,532 in 1904, an increase of $121,169.

Cleveland, Cincinnati, Chicago & St. Louis.—The stockholders have voted in favor of the plan to increase the common stock from $28,700,000 to $40,000,000. The new stock to the amount of $7,600,000 is to be offered to both common and preferred stockholders at par to the extent of 20 per cent. of their holdings. The additional $3,700,000 will be held in the treasury.

Detroit, Toledo & Ironton.—There will be a meeting of the stockholders on June 26 to ratify the purchase of the control of the Ann Arbor, through the acquiring of $3,001,000 of the preferred stock and $2,190,000 of the common stock of that company; also to authorize the pledging of this stock and $5,000,000 of the consolidated mortgage bonds of the Detroit, Toledo & Ironton to secure $5,500,000 3½-year 5 per cent. notes. These notes are to be turned over to Rudolph Kleybolte & Co. as payment for the Ann Arbor shares and $500,000 in cash. Under the collateral trust agreement not more than $1,500,000 additional collateral trust notes may be issued to secure the rest of the capital stock of the Ann Arbor amounting to $999,000 of the preferred and $1,060,000 of the common. The stockholders will also vote on approval of a contract with Rudolph Kleybolte & Co., by which in exchange for $225,000 (part of the $500,000 payment mentioned above) and $2,080,000 4½ per cent. equipment trust notes due $208,000 annually beginning June 1, 1906, 1,800 coal cars, 200 flat cars, 500 box cars and 30 locomotives are to be delivered to the railroad company.

Evansville & Princeton Traction.—This company has made a mortgage to secure $700,000 5 per cent. 20-year bonds of 1923. Of this amount, $400,000 is reserved to retire first-mortgage bonds outstanding and the remaining $300,000 is to be issued for building new lines and for improvements. The road runs from Evansville, Ind., to Princeton, 29 miles. Three extensions aggregating 85 miles are proposed; construction work to be begun in 1906.

Fort Worth & Denver City (Colorado & Southern).—As the earnings after fixed charges show no surplus for the year, no interest will be paid on the "stamped" stock of the Fort Worth & Denver City Railway. This stock is entitled to dividends out of the surplus up to 4 per cent. In 1898 and 1899, 2 per cent. was paid; in 1902, 2 per cent., and in 1903 and 1904, 4 per cent. The total amount of this "stamped" stock is $2,539,992.

Manila Electric Railroad.—The Manila Electric Railroad & Lighting Corporation has made a mortgage to the Equitable Trust Co., of New York, as trustee, to secure an issue of $5,000,000 5 per cent. first-mortgage gold bonds of 1953, of which $4,300,000 are outstanding. These bonds are subject to call (for sinking fund purposes) at 105 beginning March 5, 1908.

Mexican Central.—A representative of large holdings of the stock of the Mexican National Construction Co. has given an option, which expires September 1, to the Mexican Central to buy the stock of the Mexican National Construction Co. at $9.75 a share for the preferred and 50 cents a share for the common. The Mexican National Construction Co. built 89 miles of line from Manzanillo, on the Pacific coast, to Colima. This it now operates. If the Mexican Central exercises its option, this road will probably be used as part of the Mexican Central's line to the Pacific. If this is done, it will be necessary to build 40 miles of road from Tuxpan to Colima, whereas 125 miles will have to be built if the road is not taken over. The Mexican National Construction Co. has a capital of $700,000 preferred stock and $100,000 common stock; par value, $10 a share. In December, 1904, a dividend of $3 a share was declared on the preferred stock.

Missouri Pacific.—For the month of April, the gross earnings of this company increased 3.5 per cent. and the net earnings 27.6 per cent. Earnings for the first four months of the year were $13,000,947, an increase of 6.4 per cent. over the same four months in 1904.

New Orleans Railway & Light Company.—This is the name of the company which is to succeed the New Orleans Railways Co. as soon as the foreclosure sale under the reorganization plan is confirmed.

New York, Ontario & Western.—A dividend of 1½ per cent. has been declared on the common stock. This is a reduction of one-half from the dividend (3 per cent.) paid in January on the termination of the voting trust. Gross earnings for the year are estimated at $7,000,000, and the surplus over charges $1,300,000. A 1½ per cent. dividend calls for $871,770.

Philadelphia & Reading.—The Reading Co. has declared a dividend of 2 per cent. on the common stock, which increases the annual rate from 3 per cent. to 4 per cent. The first dividend after the reorganization in November, 1896, was in March, 1900, when 1½ per cent. was paid for the half year on the first preferred stock, which now receives 4 per cent. annually.

All bids received for the $1,800,000 new 3½ per cent. bonds of the Delaware & Bound Brook Railroad were rejected. As yet no further action has been taken in regard to the sale. These bonds are to replace $1,500,000 7 per cent. first mortgage and $300,000 extended 4 per cent. second mortgage bonds of the Delaware & Bound Brook, which mature in August.

Seaboard Air Line.—The Ryan-Blair reorganization committee has given notice to the holders of certificates of deposit for voting trust certificates of the Seaboard Air Line Railway that enough holders of such certificates have assented to the modified plan dated May 16 to enable that plan to be declared effective. The holders of certificates for 503,208 shares out of a total of 609,000 shares, or over 82½ per cent., have assented to the new plan. The committee announces that no further deposits will be received. The original plan was approved by 521,000 shares out of a total of 609,000.

Texas Central.—An annual dividend of 5 per cent. has been declared on the common stock. Previously, beginning with 1901, an annual dividend of 2½ per cent. has been paid.

Trinity & Brazos Valley (Colorado & Southern).—It is reported that the Texas Railroad Commission has approved the issue by this company of $150,000 stock and $1,580,000 bonds on 79 miles of line already built, which is at the rate of $2,000 in stock and $20,000 in bonds per mile. The Colorado & Southern controls the road.

United Railways of St. Louis.—Notice has been given to holders of voting trust certificates for common stock by F. S. Smithers & Co., of New York, that they will pay $22.50 a share for such certificates. Under the terms of an agreement with Brown Bros. & Co., who are managers of the syndicate which was formed to buy certain bonds of the St. Louis Transit Co. and bonds and stocks of the United Railways Co., it was agreed in connection with a sale to Smithers & Co. of part of these certificates that that firm should offer the same price to all other holders of the voting trust certificates.

Western Pacific.—The original first mortgage for $50,000,000 has been canceled and a new mortgage for the same amount has been ratified by the stockholders. The stockholders have also ratified traffic contracts with the Denver & Rio Grande and the Rio Grande Western. These two companies jointly and severally agree to pay the interest on the Western Pacific bonds in case there is any deficiency in the earnings of that road toward meeting this interest. On August 23, the stockholders will vote on increasing the authorized issue of capital stock from $50,000,000 to $75,000,000. Edward T. Jefferv, President of the Denver & Rio Grande, has been elected President.